MARCH, 1915.

Vol. XXXIII. *No.* 127.

THE BRISTOL MEDICO-CHIRURGICAL JOURNAL

PUBLISHED UNDER THE AUSPICES OF

THE BRISTOL MEDICO-CHIRURGICAL SOCIETY.

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The Bristol Medico-Chirurgical Journal.

"Scire est nescire, nisi id me
Scire alius sciret."

MARCH, 1915.

INTESTINAL STASIS.

BY

SIR WM. ARBUTHNOT LANE, Bart., M.S., F.R.C.S.,[1]

Senior Surgeon, Guy's Hospital; Emeritus Surgeon, Hospital for Children, Great Ormond Street, London.

GENTLEMEN,

I appreciate very much the honour you have done me in asking me to address you. I propose to talk about a subject that has engrossed my attention for the last fifteen or sixteen years or more, namely chronic intestinal stasis.

That it is a matter of very great importance is shown by the interest it has aroused, and by the violent opposition to it of all the conservative elements who bulk so largely in our profession. Still, one welcomes it, as criticism stimulates us all to success even more than appreciation. All one asks is that it should not be too unscrupulous in its methods.

[1] An address delivered before the Bristol Medico-Chirurgical Society, March, 1915.

By chronic intestinal stasis I mean such a delay of the contents of the gastro-intestinal tract as results in the absorption into the circulation of a greater amount of poisonous material than the liver, kidneys and skin can deal with. What the substance absorbed is I do not know, and from my point of view it is immaterial, as far as my definition of the condition is concerned. That a perfect knowledge of it is of the greatest importance as regards the treatment of disease is obvious. It must be apparent to the most casual observer that such rough procedures as the operations on the gastro-intestinal tract requisite to stop this infection of the circulation must be replaced or supplemented at no distant date by some simple and scientific method of treatment. At the same time, I feel that we have much to learn before such a happy result ensues.

If the operative procedures which I have devised have done no other good than to stimulate the physician to revise his outlook on medicine, they will have been more than justified.

How beautifully the importance of effective drainage of tissue is illustrated by Carrel's remarkable experiments you all know. I was fortunate to see his experiments on the growth of tissue within the first fortnight of their initiation, and year by year afterwards I saw the same tissue growing uninterruptedly and vigorously under the influence of suitable food and effective drainage.

He shows that any tissue in the body is immortal, provided it is properly fed and properly drained, and that the death of the tissue can only result from defects in food, and especially in drainage. What is true of the tissues is true of the body which they compose, except that the drainage problem in the latter is much more difficult and complex.

You readily realise how important it is to consider our methods of drainage in every particular if you are to prevent

the degenerative process which results from imperfect drainage, and the various diseases which develop in our several tissues because of their inability to prevent their inroad by organisms, etc., because their vitality and resisting power have been depreciated. To me that represents the large proportion of the diseases with which we are familiar.

The old drug treatment is gradually disappearing, and most of the operations of the surgeons are for end results, and do not meet the cause of the disease. I do not mean that the removal of the cause may in all cases cure the consequence, but it will do so in the vast majority of cases.

Our present methods of dealing with detail instead of with general principles are to a very large extent futile, and they certainly are most unscientific, and they must gradually be replaced by better ones.

Now we will consider the mechanics of chronic intestinal stasis. The delay starts primarily in the large intestine, which is the cesspool of the gastro-intestinal tract.

In consequence of the accumulation of material in this portion of the intestine it dilates and elongates. This elongation and dilatation are most marked in the first instance in the pelvic colon, and the puddling of this long dilated loop of bowel in the pelvis affords a very great obstacle to the passage of material even under the influence of great abdominal effort; indeed, the greater the intra-abdominal tension the greater the angulation of the lax bowel.

Now we must clearly understand that the structure of the human body varies in every detail with its mechanical relationship to its surroundings. If the mechanical relationship is altered from the normal, so the structure of the body varies and in direct proportion to the degree in which the mechanical relationship is changing.

This is all most fully illustrated by the remarkable changes which take place during a portion only of the lifetime of the labourer. Many of them I have described in detail in the third edition of my book on *Chronic Intestinal Stasis*. A careful study of these changes will convince the reader of the mechanism of the conditions that arise in the drainage scheme from the constant habitual assumption in civilisation of the erect posture of the trunk except during sleep.

Without a knowledge of the evolutionary changes which develop, the observer too readily (perhaps naturally) assumes that the changes to which I have called attention are inflammatory in origin.

I will describe the mechanical changes as briefly as possible, but before doing so I would point out that any effort that nature makes to meet the peculiar mechanical relationship of the individual to surroundings, while useful for a time, in the end tends to shorten the duration of life. To meet the dilatation, elongation and prolapse of the large intestine, resistances are crystallised along the lines of strain.

These are represented in the first instance by streaks, which form on the peritoneum, which is reflected outwards from the cæcum, ascending colon, hepatic flexure, splenic flexure, descending, iliac, and pelvic colon. These streaks commence at the base of the mesentery, and extend towards the bowel, which they may reach and finally control.

At certain points, especially at the hepatic and splenic flexures, and at the junction of the iliac with the pelvic colon, these bands are more fully developed. They tend to drag the flexures upwards, and to obstruct the lumen of the bowel at these points.

The same anchoring process occurs in an even more marked degree at the brim of the pelvis, where, in the female, these bands frequently attach, surround, and render cystic

the left ovary, and also interfere materially with the functioning of the Fallopian tube. This fixation about the junction of the iliac and pelvic colon I have called the " first and last kink," because it is the first to develop in point of time and the lowest in point of place. It is easy to see how the fixation of the left ovary in the anchored bowel is responsible for so much of the pain from which constipated women suffer.

Besides these three points of angulation, the lumen of the large bowel may be constricted elsewhere by a local excessive formation of bands in the mesentery. A volvulus may also develop from the same cause.

This all leads to delay in the passage of material from the cæcum and ascending colon into the transverse colon, and especially to the accumulation and stagnation of fæcal matter in the cæcum. This results in a distension of the cæcum, which drops into the true pelvis, and finally occupies it by displacing all mobile viscera.

The cæcum is suspended externally by a reflection of peritoneum, which extends from its outer and under aspects to the iliac fossa. This is strengthened in the static cæcum by the development of bands, which later form a membrane, first attaching and later suspending the cæcum. The appendix may be secured external to the cæcum by these adhesions, and its lumen being consequently obstructed at one point or another, it may become inflamed, and so-called appendicitis result.

Internally the cæcum is supported by the termination of the ileum and by its mesentery.

This may be strengthened by the formation of streaks, bands, and later membranes in the under surface of the mesentery. These then become attached to the end of the ileum, which they angulate, and whose lumen they obstruct more or less severely. Not uncommonly the appendix may

be employed to strengthen this resistance to downward displacement, when it is secured to the under surface of the mesentery.

From its position it presses on the ileum which lies in front of it, and tends to constrict its lumen in the erect posture controlling the ileal effluent. I have called this condition "a controlling appendix."

Again, the anchoring of the appendix in this situation may interfere with the free evacuation of its secretions, and it may become inflamed when the control of the ileal effluent is still further exaggerated by the inflammation of the structure which constricts the ileum mechanically. It is obvious that the material contained in the ileum may be dammed back by the block of the accumulated contents of the cæcum, or it may be produced or accentuated by the "ileal kink," to which American surgeons have attached my name; or by a "controlling appendix," which may be inflamed.

The accumulation of the ileal contents tends to produce a hypertrophy of this bowel, which is most marked in the last two or three inches. The drag exerted by the weight of the loaded small intestines angulates the duodeno-jejunal junction, which from its arrangement is very liable to control.

This causes a dilatation and elongation of the duodenum, whose contents cannot pass into the jejunum, and cannot return through the contracted pylorus to the stomach.

As the first portion of the duodenum is completely surrounded by peritoneum, and unlike the rest of this segment of the bowel is not supported by being attached to adjacent structures, it tends to show greater change in consequence of the excessive distension to which it is exposed. These changes are represented by an engorgement and inflammation, ulceration and perforation

of the mucous and other coats of the bowel. The pylorus becomes spasmodically contracted, because of the necessity of the stomach to evacuate its contents, and in order that the duodenal contents shall not return to the stomach. Material, therefore, accumulates in the stomach, which becomes dilated and hypertrophied, and which endeavours to thrust its contents through the obstructing pylorus. In these circumstances the mucous membrane of the lesser curve is exposed to a tearing strain, and it may engorge, inflame and ulcerate. Perforation of the several walls may take place, or the ulcer being very chronic may become cancerous. The mucous membrane about the pylorus, being constantly irritated by the thrust of the stomach contents, may undergo similar changes. These represent what we may call the " mechanical evidences and results of chronic intestinal stasis."

The next results of stasis are those which result from the infection by organisms of the material dammed up for an excessive period of time in the small intestine from which the nutrition of the several tissues of the body is obtained. In other words, we are considering the consequences which ensue on a contamination of the food supply by deleterious organisms.

As a consequence, the biliary and pancreatic ducts become infected by direct extension from the duodenum and indirectly through the blood supply of these organs. As a result the pancreas becomes hard and indurated, it functions imperfectly, and later may become cancerous.

Similarly the liver, overworked and supplied with an impure blood, behaves unsatisfactorily, and becomes liable to many infective processes. Infection of the ducts, the formation of gall-stone, with their consequences terminating not infrequently in cancer, all call for our attention.

The contamination of the several tissues results in the

changes I have so frequently described. The thyroid wastes, the adrenal wastes, the breasts become chronically indurated and later cancerous, the skin becomes thin and stained, fat disappears, and the several organs which depend on it largely for support drop and undergo changes in consequence. I refer especially to such organs as the uterus and kidneys. The voluntary and involuntary muscles degenerate. The heart and vessels show very definite changes in consequence of this degenerative process.

The effect on the brain is to produce a varying degree of mental depression, misery, lassitude, headache, inability to work, lunacy and imbecility, sleeplessness, neuritis of various nerves, awaking in the morning feeling no good or rest has resulted from sleep, and a tendency to fall asleep during the daytime are other evidences of the deleterious influence of auto-intoxication upon the brain. Sexual appetite is diminished or destroyed. The secretions of the skin are offensive. There are many other symptoms which are familiar to you all, to which I need not refer now.

In consequence of the depreciation of the vitality, or the lowering of the resisting power of the tissues to the entry of organisms, certain of these effect a foothold, and may after a time produce poisonous products, which aggravate the already existing auto-intoxication. Perhaps the infection that is most obvious and therefore most familiar to us all is the infection of the gums called "pyorrhœa alveolaris." How often does one see a patient's mouth rendered edentulous by the ruthless act of the dentist, acting frequently, I regret to say, on the advice of some medical man, who believes that this infection is a primary cause! How often do patients inform me that they have been assured by eminent physicians that some slight infection of the gums is the cause of all their troubles, and that the removal of the teeth will certainly cure them! All of these unfortunates have

been cruelly deceived, and bitterly regret that they were beguiled by the ignorance of their advisers.

Other common infections are rheumatoid arthritis, bronchocele, adenoma of the thyroid, exophthalmic goitre, tubercle, Addison's disease, Still's disease, the various forms of kidney disease, Raynaud's disease, and a host of other conditions which arise in the same way, and which, like the direct conditions of auto-intoxication, are all cured or alleviated by any procedure by which the ileal effluent can be freed from abnormal control, and the food supply freed from infection.

I trust, gentlemen, that I have put this matter before you sufficiently clearly to interest if not to convince you. If I have not succeeded, the limited time at my disposal and the want of the power to impress must be my excuses, not the importance of the subject-matter.

ON TOXIC POLYNEURITIS OF THE MOTOR TYPE.

BY

J. MICHELL CLARKE, M.A., M.D., LL.D., F.R.C.P.,

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IN the following cases of multiple neuritis objective disturbances of sensation were absent, and though there was a certain amount of pain, in one case considerable pain, the symptoms were essentially those of motor paralysis. Instances of this type of neuritis, excluding, of course, those of single nerves, are not at all common. The great majority of cases of multiple neuritis are those of alcoholic neuritis, in which sensory disturbances form one of the most striking

clinical features. In the early stages of the motor type of polyneuritis, when the disease is spreading and invading successive groups of muscles, the difficulty of diagnosis from an ascending paralysis of spinal cord origin, and also from certain cases of anterior poliomyelitis may be difficult. Moreover, many of the most characteristic features of multiple neuritis, as seen in the common form due to alcohol, are absent or inconspicuous. Thus in alcoholic neuritis women are far more often affected than men, and women especially between forty and fifty years of age. The legs are involved first, and in the majority of cases the arms escape or are comparatively slightly affected, whilst pains, tenderness of nerves and muscles, and peripheral loss of cutaneous sensibility are prominent, and these symptoms, together with certain other features, especially the mental changes, which form the well-known Korsakoff's syndrome, and the cardiac weakness, due to the action of alcohol on the heart-muscle, all contribute to make up a characteristic and striking clinical picture. Again, in acute toxic polyneuritis the cause is generally obscure, and often there is no clue to its exact nature.

Except in those cases which follow influenza, or some such infective disease, the onset is insidious, may take place during apparent good health, and the absence of constitutional disturbance seems to negative the idea of a microbic infection as the cause.

During the first few days of a case of toxic polyneuritis of the motor type the resemblance to ascending or Landry's paralysis is close, so that one may have to postpone decision as to the exact nature of the illness, and may have considerable anxiety as to the event, owing to the gravity of the prognosis in the latter disease.

In the majority of cases, however, of polyneuritis the onset and progress of the paralysis is slower than in a typical

case of Landry's paralysis, and in the course of the second or third week, if not at the onset, the paralysis begins to be definitely greater at the periphery of the limbs, if not in all four extremities at first, yet either in the arms or in the legs, and to predominate in the extensors, whilst alterations in the normal electrical reactions of the most affected muscles begin to be evident. These changes in electrical reactions precede the wasting, which, indeed, in some cases is not very marked throughout the illness.

The diagnosis from acute anterior poliomyelitis is not so difficult, as in the great majority the sufferers from this disease are much younger than those from acute toxic polyneuritis, and if in exceptional cases the age cannot be taken into account in distinguishing between the two affections, there are the decided signs of constitutional disturbance at the onset of acute poliomyelitis, the characteristic pains on passive movements of the joints, the absence of such symmetrical paralysis, the escape of a muscle or group of muscles in the otherwise paralysed limb, the recovery of some muscles soon after the onset, and the frequent presence of a large lymphocytosis in the cerebro-spinal fluid.

The first case I report is one of the senile type of the disease, and corresponds to the usual descriptions of this form in its insidious course, and absence of pain or other sensory disturbance; but although sensory symptoms are usually comparatively inconspicuous, they are rarely so completely absent as in this instance, in which also there was not the marked arterio-sclerosis which is generally associated with senile neuritis. The diagnosis presented no difficulty, as the signs of polyneuritis were characteristic by the time the patient came under observation.

This patient was an emaciated man aged 72. The family history was good. He had never had any illness of any kind, had always been strong, healthy and temperate, and worked very hard as a blacksmith.

Six weeks previous to admission he felt quite well on getting up, but on going to work noticed that his right leg dragged;

he was, however, able to stay at work without inconvenience during the whole of that day, but on going to bed he had to be helped upstairs, as both legs were so weak that he had great difficulty in getting upstairs even with help. He had a good night, but on waking the next morning he found the weakness had so increased in the legs that he could not stand, and had spread to both arms, so that he could not raise himself in bed. There was no constitutional disturbance of any kind, and no pain. The limbs felt "dead" and numb. Since this time he has remained *in statu quo*, confined to bed and practically helpless. Sphincters, speech, swallowing and special senses unaffected.

On admission he was very helpless and unable to move himself in bed. Tongue clean. Pulse 104. Respiration 24. Temperature subnormal. The few teeth remaining were bad. No blue line on gums. There was a moderate degree of atheroma of the vessels. Both legs were powerless except for slight movements at left hip. The feet were dropped, and toes flexed. There was also double wrist-drop, the fingers were slightly flexed and could not be extended. With great effort the right arm could be moved feebly at the shoulder, and very weak movements of the left were possible at shoulder and elbow, with feeble flexion of wrist. He could not feed himself nor use the hands for any purpose. The head and neck could be moved freely. The muscles of all limbs were wasted, especially the extensors of wrist, fingers, ankles and toes.

Diaphragm and intercostal muscles acted well.

Electrical reactions. Loss of reaction to Faradic current in extensors of left wrist and fingers, interossii of right hand, anterior tibials and peronei muscles of both legs; very feeble reaction to strong current in long extensors of right wrist and fingers and muscles of thumbs. The flexor muscles responded but feebly in arms; calf muscles also reacted feebly. All muscles reacted to the constant current, but the extensors gave a slow wave, and A C C = K C C. In the flexors the response was normal.

There was no affection of sensation to pain, light touch, heat or cold. Sense of position and of movement of limbs unaffected. No muscular tenderness.

There was a slight tremor of the left arm when movement was attempted. No cramps or spasms.

Reflexes.—Deep reflexes absent. Superficial: abdomina and cremasteric present, plantar absent.

The paralysis was entirely flaccid in type.

Cranial nerves unaffected. Pupils equal, acted well to light and accommodation. Optic discs normal. Thoracic and abdominal organs normal. Urine normal. Sphincters unaffected.

He remained in the hospital one week, his condition being unchanged, and then refused to stay any longer.

In the next case the diagnosis was for some little time doubtful, owing to the completeness of the paraplegia, and to the extensors not being predominantly affected until late after the onset. For a time also the electrical reactions were unaltered. Wasting of the muscles did not occur for a long time, and was never conspicuous throughout the illness. In fact, the slightness of the wasting in muscles which remained paralysed for months was remarkable. The pains in the cervical spine soon after the onset also introduced a doubtful element in diagnosis. The time taken for recovery, a little over twelve months, shows what is to be expected as to duration in a severe case of this type, and also that even if little progress is made for six months this need not preclude complete recovery. The case, indeed, illustrates that recovery may be perfect, if due care is taken throughout the illness in the prevention of contractures and of unfavourable position of the limbs; so favourable a result is hardly seen in any other form of paralysis. Throughout the illness there was no affection of sensation, beyond at one time a doubtful and partial anæsthesia to light touch on the outer sides of the feet. Efforts were made to find out the nature and source of the toxin, but without success. Examination of the blood and cerebro-spinal fluid and bacteriological examinations of the fauces and urine gave no clue to it.

John B., aged 34, a joiner, had always enjoyed good health, except for a mild attack of jaundice when in the Argentine five years previously. He was in a very healthy district, and never had malaria. He had never had syphilis, and had always been very temperate. Eight weeks previously he had a sebaceous cyst removed, which left a discharging sore for three weeks and then healed well. He had no sore throat. On September 14th, 1913, he had cramp in the muscles of the right leg, followed next day by stiffness in both legs, then by weakness. The

stiffness and weakness gradually increased until the 18th, when his feet tingled and became so numb that he could not tell their position, and consequently found great difficulty in walking. On the 19th he could not walk to his work, but managed to get there on his cycle. On the 20th he found he was unable to walk without support, as he lost his balance, and was unable to tell the position of his legs unless he looked at them. On this day numbness and tingling, with weakness, also appeared in both hands. On the 23rd he felt a feeling like a " lump of lead " in the abdomen. From this date the weakness of the limbs steadily increased, and he was confined to bed until his admission to hospital on October 2nd.

On admission he was well nourished and healthy-looking. The pulse was 88, the respiration, tongue and temperature normal. The bowels moved by aperients. The thoracic, abdominal organs, and urine were quite healthy. He was unable to stand, but could just move the legs slightly at knee and hip joints, otherwise they were paralysed. The paralysis was flaccid. There was no foot drop. The muscles were not wasted : they all reacted to a Faradic current. The constant current gave so much pain that it could not be used. There was no affection of sensation to pin, cotton wool, heat or cold. The sense of movement and of position was not lost.

Reflexes.—The deep reflexes in the legs were absent, in the arms absent or very feeble.

Superficial reflexes.—Plantar absent, cremasteric present, abdominal very feeble. No pain on passive movement of limbs. Slight loss of power in forearm and hands. Special senses and cranial nerves unaffected. No optic neuritis ; no alteration in speech or swallowing. Sphincters unaffected. Spinal column normal : no tenderness over spines. Cerebro-spinal fluid on lumbar puncture gave a slight excess of cells, lymphocytes and endothelial cells. Wassermann's test negative for blood and cerebro-spinal fluid. A swab from throat showed no Klebs-Löffler or diptheroid bacilli. Blood normal : no leucocytosis. Bacteriological examination of urine negative. Stools appeared healthy. At this stage it was impossible to make the diagnosis as to the exact nature of the lesion causing the slowly spreading paralysis of the legs. The mental condition was quite clear and good.

During the next two weeks he suffered much pain in the neck and back of the head. At the end of this time paralysis of both lower extremities had become almost complete, except for very slight movement at the hip-joints ; there was now marked foot-drop on both sides. Numbness (without objective loss of sensation) and loss of power in the hands had increased, each grasp registering only 15 on inner dynamometer scale, and the deep reflexes in the arms were now completely abolished. There was still no muscular wasting, and his condition was

otherwise unchanged. A few days later the abdominal reflexes disappeared, and he complained much of a girdle pain. Three weeks after admission electrical reactions showed in the legs diminished reaction to interrupted current, especially in dorsiflexors of feet and long extensors of toes. To constant current the calf muscles gave normal reaction. The quadriceps extensors only reacted to a very strong current Right KCC=10 m.a. Left, KCC=14 m.a. ACC=18 m.a. Peronei and tibialis antici on both sides, KCC=1 m.a. ACC=2.5–3 m.a., and the contraction wave was slow.

On November 6th there were slight signs of wasting in the leg muscles, especially marked in the anterior muscles of the legs below the knee. The muscles were now also distinctly tender to pressure, and there was pain on passive movements of the ankles. There was a definite reaction of degeneration (R.D.) in peronei and tibialis antici muscles, and also some loss of sensation of movement and of position in left leg. Sensation otherwise unaffected.

By the end of November the paralysis had increased in the forearms and hands, which had become very weak, and the muscles of the forearms and the interossei appeared to be wasting. He could feed himself, but not cut up his food. There was indefinite and slight loss of tactile sensation on outer borders of feet. The only movement left in the lower extremities was internal rotation at hip-joints. The muscles of the lower extremities gave a slow, very feeble response to a very strong Faradic current ; those of the forearm, especially extensors, and of the hand also reacted badly, whilst the arm muscles gave a normal response. The nerves responded well. The leg muscles (below knee) now all showed reaction of degeneration to constant current. He remained much the same until the middle of January, when the forearms and hands began very slowly to gain power. The small muscles of the hands had wasted, and showed occasionally fibrillary twitchings. During this time all the muscles had become tender to pressure. The foot-drop had increased, and the legs were now placed in splints. Sensation remained normal, and the bladder unaffected. There was continued constipation. He could not sit up in bed. The diaphragm was never involved. All the reflexes in the limbs were lost, but the cremasteric and abdominal reflexes, though feeble, were present. The only muscles of the legs that responded now to the Faradic current were the right gastrocnemius and tibialis anticus, and adductors of left thigh.

During March he began slowly to improve, regaining first power in arms and hands, and then in hips. The muscles were no longer tender. In April he could sit up in a chair, swing his legs backwards and forwards, and slightly extend the left leg. There was, however yet no recovery of power in muscles below

the knee. In May he could very nearly stand without support, could walk with the aid of a walking machine, and by the end of the month could walk by pushing a chair in front of him. The foot-drop still remained for a long time afterwards. The subsequent course of the case has been one of very slow but steady recovery, so that he is now able to get about, and is going to take up some light employment. The knee-jerks are still absent.

In the following case, as in the preceding instance, the cause of the disease could not be ascertained, the onset was insidious, whilst the patient was apparently in perfect health. His occupation exposed him to extremes of heat and cold, and often involved heavy muscular work.

The distribution in this case is peculiar, and differs from the two just reported. The disease began in the upper extremities, with two days later weakness in legs, not proceeding to actual paralysis for three to four days longer. Moreover, in the legs the thigh muscles were those chiefly affected, and those below the knee at first escaped, to be involved later. The paralysis in all four extremities was, however, strictly symmetrical, and from the onset was in the arms of the peripheral type, extensor paralysis predominating, and the extensor muscles alone showed commencing reaction of degeneration (R.D.). In the lower extremities the quadriceps extensors are especially affected, and show more wasting and alteration of electrical reactions than any other muscles of the body. In spite of the somewhat unusual distribution of the muscular paralysis, there is no doubt of the case being one of toxic polyneuritis. As in the other cases, there is a complete absence of sensory affection, subjective or objective, apart from pains in right shoulder at the onset. This was the only fatal case.

Alfred T., aged 50, a marine fireman. He had never had any illness of any kind, and denied any venereal disease. He had six healthy children. He had been moderate as to alcohol, but smoked about one ounce of tobacco daily.

Three weeks before admission, whilst in perfectly good

health, he had pains in right shoulder; on the following day he went to work, but felt weakness in both arms and hands; on the third day the weakness had so much increased in the arms that he was unable to work. By this time he felt some weakness of the lower extremities, which did not increase, and he was able to get up and sit about until three days later, when, on getting out of bed in the morning, his legs gave way and he fell to the ground. He remained in bed practically helpless for ten days longer, and was then admitted to hospital. There were no symptoms of constitutional disturbance, no pain after the first day; some tingling and feelings of pins and needles in forearms, hands, legs and feet. He had had some headache, the mind has been quite clear. Profuse sweats occurred at night, but no fever. Sphincters unaffected.

He did not come into contact with lead in his work.

On admission he was a well-built, healthy-looking, well-nourished man. No blue line on gums. Gums and teeth healthy. He lay in bed on his back, with arms across the abdomen. Except for some movements in the shoulder, chiefly due to pectorales, serratus magnus and trapezius muscles, the upper extremities were completely paralysed. When they were raised there was double wrist-drop. He could not sit up, turn, or move himself in bed. In the lower extremities slight rotation of hips and slight dragging up of legs by thigh muscles were possible, the ham-strings and extensors of legs were paralysed, but he could flex and extend ankles and toes freely but feebly; with this exception the lower extremities showed complete paralysis, could not be raised off the bed, and were useless.

The paralysis was of the flaccid type. Slight wasting of muscles was noted in the left quadriceps extensor, perhaps also in the right, in the extensors of wrists and fingers, and in the muscles of the thumbs and the abductor indicis. It was nowhere conspicuous, and the other muscles preserved their normal size.

There was no paralysis of any of the cranial nerves. Pupils equal, dilated, reacted to light and accommodation. Optic discs normal.

Speech and swallowing normal. Movements of head and neck unaffected.

The chest moved well in respiration, the movements of the diaphragm were perhaps a little feeble.

Sensation to touch, pin-prick, heat and cold everywhere normal. He retained the sense of position of his limbs; passive movements were not painful, and the muscles nowhere tender.

Reflexes.—Deep; biceps and triceps jerks present on both sides, wrist, knee and ankle jerks absent.

Superficial.—Abdominal absent, cremasteric present, both plantar present and flexor in type.

Bladder unaffected ; bowels constipated. Pulse 80, regular. Respiration 24.

Thoracic and abdominal organs normal. Urine 1026, no albumin, no sugar, loaded with urates.

Cerebo-spinal fluid under normal pressure and clear. Cells normal, a few lymphocytes only being present. Wassermann's test negative.

Examination of Blood.—Red cells 6,000,000 per c.m., hæmoglobin 90 per cent., leucocytes 19,000 per c.m., polymorphs 69 per cent., mononuclears 30 per cent., eosinophils 1 per cent.

One week after admission electrical reactions were as follows :—

Interrupted current.—Normal response in all muscles except the extensors of wrists and fingers and quadriceps extensor on each side, where a strong current was necessary, and to a less degree in small muscles of hands.

Constant current.—Right arm, in long flexors and extensors, KCC=ACC, 7 and 5 ma. respectively. Left arm, long extensors, wrist and fingers, KCC=8 ma., ACC=6 ma. Flexors, wrists and fingers, KCC=5 ma., 7 ACC=8 ma. Right abductor indicis, KCC=3 ma., ACC=7 ma. Left KCC=6 ma., ACC=7 ma. Legs, right quadriceps extensor, KCC=12 ma., ACC=10 ma. Left quadriceps extensor, KCC=18 ma., ACC=12 ma.

Other muscles gave normal reactions. The patient was very tolerant of both currents.

Ten days after admission the condition of the arms as regards paralysis was unchanged, wasting of the forearm muscles was more evident ; the diaphragm was slightly affected ; there appeared to be little if any power in the abdominal muscles, to which the constipation was partly attributable ; the thigh muscles were slightly more wasted ; and the paralysis had slowly spread to the legs, so that hardly any movement of feet and toes was possible, and the right foot was dropped. Plantar reflexes present, but very feeble. Other reflexes absent. In other respects his condition was unaltered. Sensation good everywhere.

During the next few days the action of the diaphragm became increasingly feeble, the respiration was quickened, the pulse became increasingly rapid and weak, the heart's action feeble, and he had difficulty in swallowing. The movements of the tongue and speech were unaffected, the facial and oculomotor nerves were not involved. He died of heart failure two weeks after admission. A *post-mortem* examination was not permitted.

The fourth case is that of a woman aged 33. She had been married about eighteen months, and before marriage was completely worn out by nursing her mother through a long

illness. Her father died of diabetes. She had had no previous illness, and had always been temperate. The illness began with pains and loss of power in the legs two to three months before her confinement, which took place about three months before admission to hospital. For two months previous to confinement she lay in bed with her legs drawn up, and screamed if they were extended. Delivery was normal, no instruments being used. After it the paralysis spread to the arms. The pains in the legs began some time before she lost power in them. There had been no pains in the arms, but they felt dead or numb. The limbs rapidly wasted, and for two months before admission she had been helpless and unable to feed herself. From the fifth month of pregnancy and continuously since she had suffered from salivation.

On admission she was emaciated, there being no subcutaneous fat, and the muscles everywhere showed an extreme degree of wasting. She lay on her left side with her knees fully flexed, and thighs flexed on abdomen. The legs were contracted in that position, and she screamed when they were moved.

Appetite good. Tongue furred and tremulous. Pulse 120, respiration 20. Temperature normal. Bowels constipated. The teeth were very bad, many carious stumps, gums spongy, with pus around roots of teeth. No blue line on gums, no evidence of any source of lead poisoning.

The salivary glands were not enlarged: there was an almost constant flow of saliva. The thoracic and abdominal organs appeared to be normal. Urine normal. The pupils were unequal, but reacted well to light and accommodation. Optic discs normal. There was paresis of muscles of left side of face. Otherwise the cranial nerves were normal, and swallowing and speech unaffected.

She complained of some pain in the neck, but movements of head and neck were free.

Arms.—She could raise the arms, and flex, and extend the elbows partially. All the muscles of arms and forearms were much wasted. There was double wrist-drop, the small muscles of the hands were wasted, the thumbs and index fingers were in position of extension, the other fingers flexed. The left index finger could be flexed, and the thumbs could be partially opposed and adducted: otherwise paralysis was complete.

Trunk.—The abdominal muscles and those of the back were much wasted; she could not sit up.

Legs.—Glutei were wasted, and there was great wasting of all the muscles of the legs, especially below the knee, where the anterior tibial and peronei had practically gone, leaving a hollow. The ham-strings and calf muscles were relatively well preserved. There was complete double foot-drop, and all the toes were in position of flexion.

The only movements possible were feeble flexion of the hips, and slight movement of the legs. From contraction of tendons and adhesions in the joints neither hips nor knees could be passively moved beyond a right angle; and such movements caused much pain.

None of the muscles were tender, and there was no tenderness over the course of the nerves.

Electrical Reactions.—To Faradism muscles of arms acted well; those of forearm, especially extensors, feebly. Small muscles of hands reacted well; the quadriceps extensor and ham-string muscles gave a weak reaction. The calf muscles contracted to a strong current. No reaction was obtained from the peroneal nerves, peronei, tibialis anticus and long extensors of toes. The constant current gave her great pain, and the reactions could not be well taken, but no reaction of degeneration was found save in the muscles of the anterior and outer aspect of legs.

The deep reflexes were absent, abdominal present, plantar absent. There was nowhere any affection of sensation to light touch, deep pressure, pin-prick, heat or cold. The sense of localisation of touch and of position of limbs was not lost. The sphincters were unaffected.

The patient's mental condition was childish, she cried very easily; but there was no loss of memory or confusion of ideas.

The first point in treatment was to get the limbs into better positions. She was therefore anæsthetised, numerous firm adhesions in and about the hip, knee, and ankle joints were broken down, and the legs placed on straight splints. The upper extremities were also freely moved at all joints.

Subsequent treatment was by gentle massage and passive movements and Faradism, with maintenance of the limbs in suitable postures in order to prevent dragging on the paralysed muscles. The salivation gradually ceased.

After five months' treatment in hospital she had recovered sufficiently to return home.

This is an example of the somewhat rare though well-recognised form of multiple neuritis which occurs in pregnancy, or during the puerperium. If the onset is during pregnancy, the symptoms may become more marked after labour, which, as in this case, may take place normally. The disease appears especially in patients who suffer severely from the vomiting of pregnancy. In puerperal cases the cause is generally held to be a septic infection; in those arising during pregnancy it is attributed to an intoxication

related to the physiological processes of that condition, or by others, *e.g.* (Huber) to infection from a previous puerperium or from uterine disease (Oppenheim). In some cases the progress of paralysis is rapid, and the disease may take the form of Landry's paralysis. The possibility of alcohol as an additional factor in causation must be remembered. In this case there was no evidence of alcohol, but the patient was exhausted by long nursing before she became pregnant.

The prognosis in this form of neuritis is as a rule favourable.

The last case is one in which the chief symptom was inco-ordination, combined, as the disease went on, with a certain amount of definite paralysis, the latter being symmetrical and of the peripheral type. The presence of actual muscular weakness is important in the diagnosis from tabes dorsalis, because it is not a feature of this disease until, at any rate, a late stage is reached. The ataxy in this case reached an extreme degree, as marked as I have ever seen it in a bad case of tabes dorsalis, and was, indeed, so severe as to render the limbs useless. Moreover, it was attended by marked hypotonus, so that the joints and limbs could be placed in very abnormal positions without causing discomfort. The loss of the muscular sense and of that of position of limbs was also pronounced. Some doubt has been thrown on the existence of severe ataxia in multiple neuritis, it being held that errors in diagnosis have been made, and that the cases are really examples of tabes dorsalis, in which the association of disease of peripheral nerves with that of the posterior columns of the cord in tabes dorsalis, which is of frequent occurrence, is more than usually pronounced and extensive.

Dr. Judson Bury sums up his study of the question [1] by saying (1) that ataxia is rare in peripheral neuritis even when

[1] Allbutt and Rolleston's *System of Medicine*, 1910, vii. 449.

cutaneous and muscular sensibility are profoundly affected; (2) that it occurs occasionally when signs of muscular weakness and of diminished cutaneous sensibility are slight or absent.

Undoubtedly marked ataxia is a rare feature of multiple neuritis, and especially when, as in this case, there is no affection of common sensation. This is the only instance of the kind and degree that has come under my observation. In the diagnosis in this case I would lay stress on the complete absence of all signs of affection of the spinal cord, and on the presence of a definite amount of paralysis in the legs of the peripheral type, symmetrical, and accompanied by some muscular wasting, and on the recovery that took place in a comparatively short time. These are the essential points in the diagnosis of ataxia due to polyneuritis. One may also remark on the affection of the facial nerve, and its recovery after a short time. This is the cranial nerve which is most commonly affected in multiple neuritis.

Another feature was the presence in the wasted muscles of fibrillary tremors or twitchings, also an unusual symptom. This symptom was also present in the second case. It is to be expected that it should sometimes occur in these severe cases of multiple neuritis in which the whole of the lower motor neurone, including the anterior horn cell, is more or less affected. The cause in this case may either have been alcohol, in spite of his statement that he had been temperate for some years, or an infection through the urinary tract, as he had B. coli pyuria, or possibly the action of the latter upon nerves previously sensitised by excessive indulgence in alcohol.

John P., æt. 49, was admitted to the hospital in July, 1906, complaining of loss of power in the legs and arms. The onset was gradual, and began in the left leg a few months before: during the last month the arms and hands had become affected.

He was a traveller, and had had no previous illness except a

chill (? influenza) twelve months before. For twenty years, up to the age of 42, he had been accustomed to drink about a bottle of whisky daily in the course of his business; since that age, according to his own statement, he had been a teetotaller. For some months he had been unable to get about, and had been confined to bed for over one month. He had never had syphilis.

He was a well-nourished man, with florid complexion and dilated venules on cheeks, and watery eyes, the vessels were thickened and tortuous; the pulse full and of high tension; the heart's apex beat was one inch outside the nipple line, the aortic second sound accentuated; the urine (sp. gr. 1010) showed no sugar or albumin; the lungs and abdominal organs appeared healthy.

There was no blue line on the gums; the tongue was tremulous but not wasted: its movements were inco-ordinated. He could not stand or sit up in bed, could not use his hands to feed himself, or hold a newspaper. When he tried to pick up anything the movements of the hand and arm had a peculiar swooping character. All movements of the hands, arms, legs and feet were wildly ataxic in character, and this was greatly increased when his eyes were closed. Without sight he had no idea of the position of his limbs. There was no absolute paralysis, but the extreme ataxy practically meant that he could not make use of his limbs for any purpose. Though no movements of the lower extremities were entirely absent, yet there was considerable loss of power in them, in addition to the ataxy, and this loss of power was chiefly in the muscles moving the ankle and foot (periphery of limb). This was not the case in the upper extremities, where the right grip measured 30 and the left 20 on inner scale of dynamometer. The muscles of the arms, hands, and trunk were not wasted. On the other hand, the glutei and all muscles of lower extremities, except the ham-strings, were wasted, and the wasting was especially marked in the anterior muscles of the thigh, and tibialis anticus and peronei group. The big toes were dropped, but not the feet.

There were irregular muscular twitchings almost amounting to fibrillary tremor in the most wasted muscles. The muscles all reacted to both interrupted and constant currents, but in the wasted muscles the response to the former was diminished, and to the latter increased, without any reversal of the normal formula. The muscles were flaccid, with loss of tone: in the legs there was considerable hypotony, it being possible to put the joints into very abnormal positions without causing pain. The muscles were not tender, but there was slight tenderness over nerve trunks.

Reflexes.—Superficial: abdominal and cremasteric present, plantar doubtful. The deep reflexes were absent in both arms and legs.

Sensation to light touch (cotton wool), pain (pin-prick), heat and cold was everywhere unaffected. Localisation of sensation was also good. The sphincters were unaffected throughout. Pupils equal, reacted to light, accommodation and consensually. Optic discs normal. Other cranial nerves normal. Special senses normal.

During September he had two rigors and fever, with the appearance of a quantity of pus in the urine due to a B. coli infection of urinary tract. The symptoms cleared up under treatment in the course of a month, but B. coli with a few pus cells persisted in the urine. After the first rigor there appeared partial paralysis of the right facial nerve, which gradually disappeared during the next fortnight.

The general treatment was by massage, electric baths, and systematic training in movements of the limbs. For a time the wasting of the leg muscles continued, and to such a degree that the calf muscles had the feeling described by Gowers of "a bag of worms." Fibrillary twitching in the muscles most wasted was often noticed. At the end of September he began slowly to improve, the arm muscles first recovered their tone, the movements became less inco-ordinate, and he was able to use the arms and hands. Improvement in the legs followed more slowly, the fibrillary twitchings ceased, movements improved, and the wasted muscles very gradually recovered. By December he was able to stand and walk with support, and in January, 1907, with the aid of sticks. Though not recovered, for recovery of the wasted muscles would take a still longer time, he was so much improved and so much more able to help himself, that he left the hospital in this month. The deep reflexes were still entirely absent. There were no mental changes throughout the illness. There were no shooting pains, no joint or skin lesions, and no tendency to bed sores.

ON THE PERNASAL OPERATION FOR FRONTAL SINUS SUPPURATION.

BY

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MANY patients on whom the writer's intranasal or pernasal operation has been performed for the relief of frontal sinus suppuration have been demonstrated at meetings of the

FIG. 2.

Bone specimen showing the fronto-nasal passage with probe passing through ; the dotted line shows the route of anterior entry through agger and other ante-conchal cells. Note the "anterior entry" is well in front of the cribriform plate.

Bristol Medico-Chirurgical Society, and I propose to describe shortly the operative technique of what I have termed the anterior route, without touching on the various methods of intranasal operation employed by other workers, which have been incorporated in my Introduction to a recent discussion on this subject at the Royal Society of Medicine.[1]

The non-external operations for frontal sinusitis fall under two classes, (*a*) those restricted to the removal of ethmoid cells and other structures within the nasal fossa below the frontal sinus, *i.e.* the strictly intranasal operations; and (*b*) those in which the operative field comprises parts entering into the formation of the sinus itself, *e.g.* the nasal crest and any other structures above the lower end of the ostium frontale, in which case the operation is no longer intranasal, but pernasal. The terms *intranasal* and *pernasal*[2] are, I

FIG. 3.

The author's spheno-ethmoidal angular forceps, made in two sizes. All the instruments are marked in inches from the tip, so that the precise distance from the naris that any instrument has been passed can be at once determined.

think, better terms for the difference in extent of operation than the words "incomplete" and "complete," which I have formerly used.

Practically all the internal operations for frontal sinus disease in general use are various degrees of intranasal

[1] *Proc. Roy. Soc. Med.*, 1914, ii. 121–23.

[2] The term *pernasal* was suggested to me by Mr. William Hill.

operation. To Fletcher Ingals, of Chicago, the credit is due of having devised the first practical method of operating on the frontal sinus ostium itself, *i.e.* of extending the operative field to the frontal sinus. Ingals reported in 1905 successful results from the operation, but it seemed to involve so much

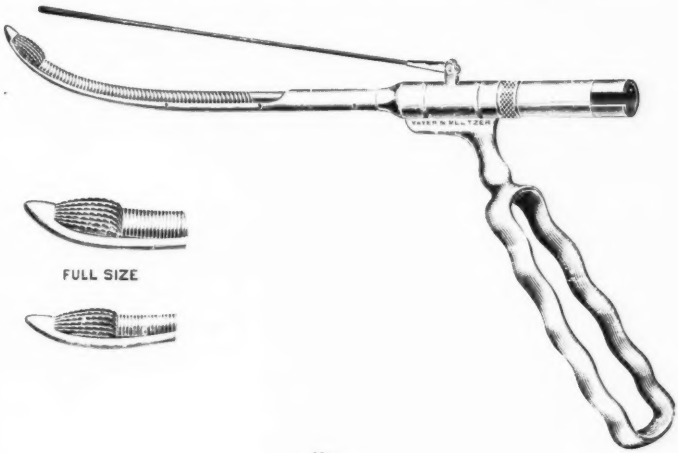

FIG. 4.

The author's guarded rotating burrs, which are fitted with a standard No. 2 Asch's "slip-on joint." The burr having been passed up the nose to the seat of obstruction, the nasal crest, the straight indicator, which is movable, is made to lie against the face outside and its tip indicates the position of the burr in situ. A finger disconnecter, not shown, allows the cable to be disconnected at any moment.

risk to the patient that his method has never been generally accepted. Others have tried to improve on the methods of Ingals, and for some years I have sought what I venture to think are methods which at least have the advantage of being safe, provided reasonable care and skill be conjoined with an intimate practical acquaintance with the anatomy of the region and its variations from what is regarded as normal.

The alternative to intranasal or pernasal operative measures for frontal sinus suppuration is the external operation, which unfortunately affords no certainty of a

completely successful result, always exposes the patient to the risk of septic osteo-myelitis, which is usually fatal, and is liable to leave a depressed scar, which may amount to a cosmetic deformity. Though in the course of a fairly large series of external operations I have been fortunate in having no case of osteo-myelitis, and the majority have been cured with little and sometimes no cosmetic defect, such happy results are far from invariable, and in two cases a fatal termination resulted, once from a congenital dehiscence in the cribriform plate, and in another patient from a pre-existing frontal lobe abscess.

An external radical frontal sinus operation should be avoided unless the symptoms are so severe that relief is urgently called for, and unless intranasal operations have failed or are impossible to perform. The intranasal or per-nasal method is sometimes rendered inapplicable owing to anatomical irregularities, which prevent one making a safe entrance to the sinus, and if no *entrance* can be effected, it is impossible to *enlarge* the fronto-nasal passage. I have met with one such case, and subsequently an external operation showed clearly that no operation through the nose could have succeeded. But, on the other hand, even a very large fronto-nasal passage, such as affords ample and effective drainage between the sinus and the nasal passages, does not ensure a cure or even satisfactory relief, for the sinus may be full of polypoid granulations, or may be in communication by a narrow opening with some large orbito-ethmoidal cell, which is altogether out of the reach of any pernasal operation. Yet such conditions are exceptional, and by the method described below the large majority of cases of frontal sinus suppuration, over 90 per cent., may be either cured or so greatly relieved that there is no need to consider a radical external operation.

An acute frontal sinusitis will often recover spontaneously, but chronic frontal sinusitis rarely, and for

the reason that if the existing anatomical conditions or associated ethmoidal cell infection did not make a spontaneous recovery out of the question, the frontal sinus would have recovered in the early or acute stage, and thus would not have become chronic. It is therefore hardly

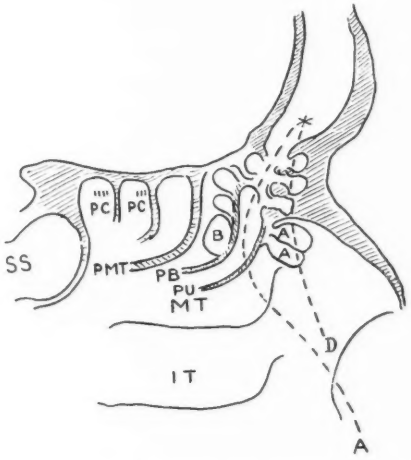

*Diagram of the ethmoidal labyrinth and fronto-ethmoidal cells, showing the curved entry, A to *, of the old method of catheterization of the frontal sinus, as compared with the direct anterior method of entry advocated, D to *—i.e., the creation of a new artificial fronto-nasal passage. A, A, agger cells; PU, plate of the uncinate process; PB, plate of the bulla, B; PMT, plate of the middle concha; PC''' and PC'''', plates of the concha superior and concha suprema.*

surprising that the intranasal treatment of chronic frontal sinusitis should have presented many difficulties, because almost invariably there are anatomical obstructions to entering the sinus, which have been the determining factor in preventing the draining of the sinus discharge. True, in a few cases, after an anterior middle turbinectomy the simple removal of a few of the lower ethmoidal cells around the lower end of the fronto-nasal passage suffices to permit of lavage of the sinus. But the infection of the higher and anterior

ethmoidal cells often cause so much thickening of the mucosa and encroachment on the narrow passage, that no effective spontaneous drainage can result, and constantly-recurring acute attacks, or at any rate a persistence of the sinus disease, is then a frequent experience. To overcome the inherent defects of the accepted minor operative measures, a number of pernasal operations have been introduced, but for the most part have seemed to expose the patient to greater risks than the external radical operations which have therefore been very generally performed.

With a view to procuring spontaneous free drainage of the frontal sinus without danger, I devised the methods of procedure described below, and have operated on more than a hundred frontal sinuses of patients. The operation is usually a relatively easy one, and may be done under local anæsthesia, although for many patients a general anæsthetic is to be preferred.

It is always most desirable to have good skiagrams, one antero-posterior to show the extent of the sinuses upwards and laterally, and another lateral skiagram to show the depth of the sinuses. The importance of the skiagram as an aid to operation, apart from its value in the diagnosis of frontal sinus disease, lies in the fact that a quite small undeveloped frontal sinus may exist, and the instruments might reach the summit before they had apparently been properly introduced, and anyhow a small sinus presents more difficulties to pernasal operation than a large one. Of greater importance is the possibility of a frontal sinus being so rudimentary that from a clinical standpoint it is absent, hence there would be a greatly added risk of injuring the cribriform plate in trying to pass probes or sounds into the sinus.

While emphasising the assistance afforded me by skiagraphy, I am especially indebted to Mr. James Taylor for

the skiagrams of a large number of cases at the Bristol Royal Infirmary, including those examples which have been used for the illustrations included in this article.

For my method of operating by the anterior route the essential instruments are (1) small angular punch forceps, made in two sizes, (2) frontal sinus rasps for the crista nasalis. For the rapid reduction of the nasal crest the

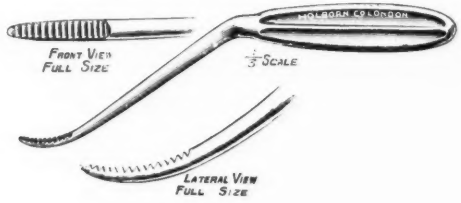

FIG. 5.

The author's small raspatory. At the tip it measures only 2 mm. in width, and it can only cut forwards; the end also is blunt.

guarded electric rotating burr is exceedingly useful, and I have also used with advantage sliding punch forceps, but neither of these instruments are essential. The bougies or sounds are merely for measuring the size of the fronto-nasal passage obtained, never for making the passage, but they are useful subsequently for maintaining the patency of the passage during the process of healing.

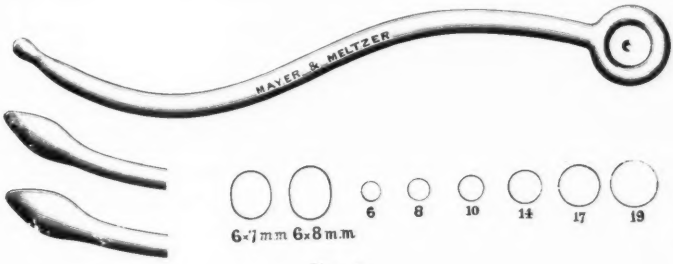

FIG. 6.

The Operative Technique.

A. Intranasal operation.

1. With small angular ethmoidal forceps engage the anterior margin of the middle turbinal at its point of attachment to the outer nasal wall. Cutting through this, the forceps enter the anterior ethmoidal cells in front of the fronto-nasal passage (*see* fig. 7).

2. Keeping to the outer side of the vertical plate of the ethmoid, clip away all the agger cells and the other anteconchal cells right up to the crista nasalis (fig. 8).

3. The anterior ethmoidal cells lying behind or above the fronto-nasal duct, including the bulla ethmoidalis, are now removed by the forceps as far back as may be necessary.

4. Using the larger forceps, the thicker projecting partitions of the cells are laid open and punched away. (Only the blunt tip of the female blade can come in contact with the roof.)

5. The bougies (fig. 6) are then passed into the sinus, so as to gauge the size of the fronto-nasal channel thus formed. Usually Nos. 18 or 19 will enter, sometimes 19–23, or 19–25. (The figures give the circumference in millimetres, hence 19 has a diameter of 6.05 mm., or $\frac{1}{4}$ in. A 19–25 bougie measures 6 mm. in width and 8 mm. in antero-posterior diameter.)

In a considerable percentage of cases this intranasal operation suffices for permanent free and spontaneous drainage of the sinus.

B. Pernasal operation.

If such a large bougie will not enter, the bone corresponding to the nasal crest *may* be shaved away by the sliding cutting forceps (fig. 9) till these large sizes can be introduced, or the crest reduced first by the smaller guarded burr, or a small-sized sharp raspatory (fig. 5), till the passage

admits the burr or forceps. When a No. 17 enters the sinus the bony boss can be burred away first with the 4 mm. wide burr until it enters the sinus (fig. 10). When the frontal sinus opening lies well to the outer side and tends to guide entering probes towards the orbital roof, unless contra-indicated by skiagram, it is well to draw the sliding forceps or burr towards the front so as to enlarge the frontal ostium to the front and inwards rather than towards the orbital roof outwards.

6. With the small forceps, which now enter freely, the projecting walls of any remaining ethmoidal cells may be clipped away to render the passage more free.

Up to this point the middle turbinate body has been left practically intact, and the whole operative procedure takes place outside the vertical plate of the turbinal, that is outside the line of the cribriform plate. In exceptional cases, where the anterior end of the turbinal is enlarged or cellular, it may be necessary to remove it at this stage, but as a rule it is left for some days, at least until the sinus has been lavaged several times. This has the advantage of shutting off the operative field, through which the infective purulent discharges of the sinus have to make their exit, from the olfactory fissure. If one makes an entry to the fronto-ethmoidal cells through the upper part of the vertical plate of the middle turbinal, not far from the cribriform plate, in the manner described by Mosher, it involves the risk of a septic thrombo-phletitis, and increases the liability to a meningitis spreading by this route.

One advantage that may be claimed for this method of entry as compared with methods with unguarded burrs is that the mucous membrane is not stripped from the posterior and lateral walls of the new passage, for although the cell partitions are clipped away, the mucous membrane of the cell bottom is mostly retained. Only anteriorly is the bone

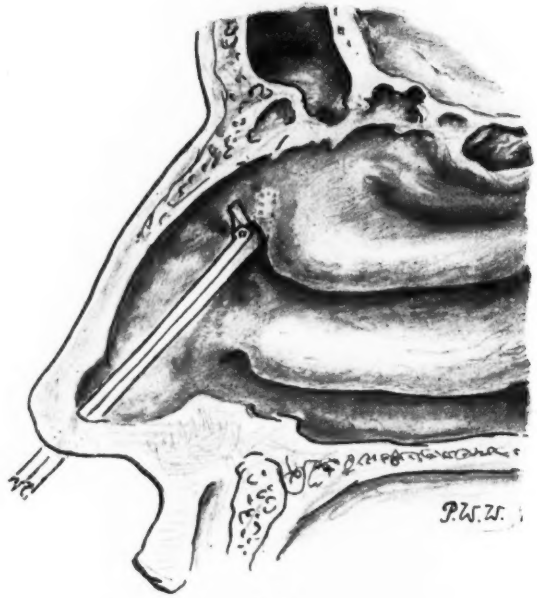

FIG. 7.

To show the initial point of entry in the intranasal frontal sinus operation. The small spheno-ethmoidal forceps are seen cutting the point of attachment of the middle turbinal to the outer nasal wall, thus entering the fronto ethmoidal cells.

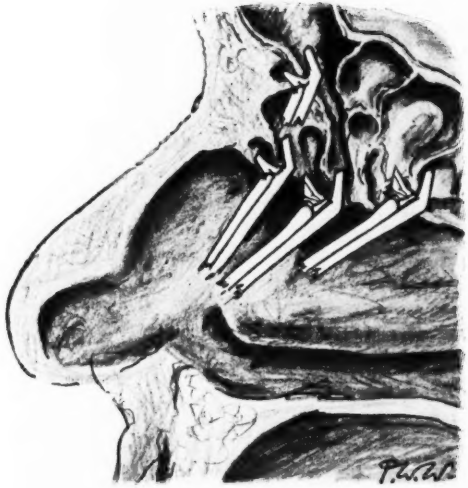

FIG. 8.

To show the author's small spheno-ethmoidal forceps clipping down walls of the ethmoidal cells external to the vertical plate of the middle turbinal.

thus entering the fronto-ethmoidal cells.

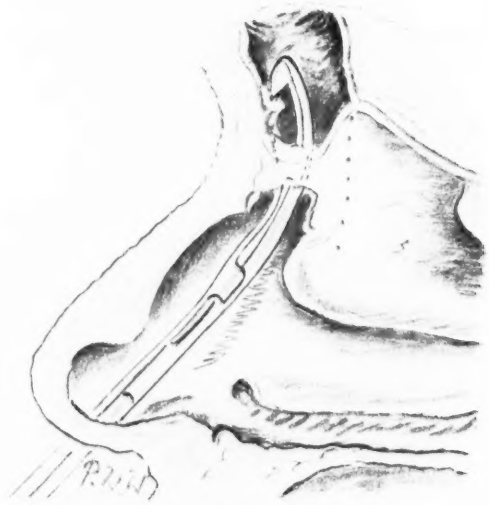

FIG. 9.

The sliding cutting forceps reducing the crista nasalis and projecting bony ridges after the cells have been opened by the small cutting forceps. The middle turbinal shown in situ. The dotted line shows the forward extent of the cribriform plate.

FIG. 10.

Skiagram of patient showing 4 mm. burr on nasal crest.

FIG. 11.

Skiagram showing 6 mm. thick round bougie entering frontal sinus, but carried back so as to impinge against tabula interna because the nasal crest is thick.

FIG. 12.

The same case, but showing the 6 mm. (No. 19, French scale) bougie entering well into the sinus after reduction of the nasal crest by burring.

Skiagrams showing Watson-Williams's swan-head bougie, 8 mm. by 6 mm., entering the frontal sinus after removal of crista nasalis.

FIG. 13.

Case of W. C. Lateral view of left frontal sinus and swan-head oval bougie.

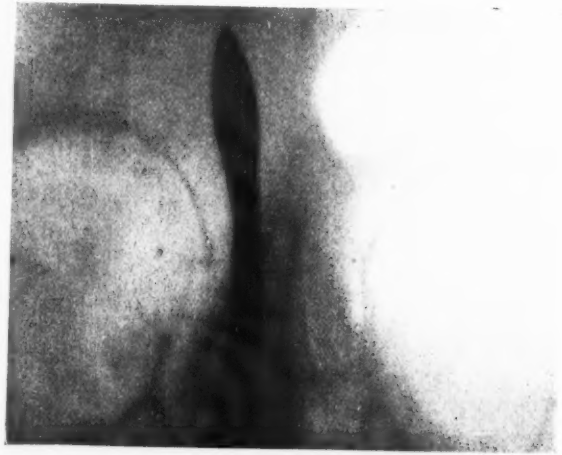

FIG. 14.

The same, antero-posterior aspect. The skiagram shows the right sinus healthy, the left sinus containing the bougie being diseased. (Skiagram reversed in print.)

laid bare, and that for a strip about 6.5 mm. wide, and this can apparently recover itself by extension from the muco-periosteum on either side. Is it not better to have a 6 or 7 mm. wide passage which is lined with mucous membrane than a wider one which can only granulate over and which is much more liable to subsequent contraction ?

A septal deflection, unless so pronounced and so situated that it is impossible to reach the operative field, should be left to be dealt with when the infected sinuses have recovered or are more healthy ; if necessary, the septum can be pushed over to the other side by a Killian speculum. I have operated successfully on a frontal sinus when a septal deflection concealed from sight the middle turbinal and every part of the operative field.

After-treatment consists :—

1. In lavage of the sinus, first with saline solutions and weak peroxide of hydrogen and some mild antiseptic, such as colloidal or other silver preparations, iodine solutions, and so forth, and later with stronger solutions if necessary.

2. In the passage of the largest bougie the canal will take comfortably, repeated at short intervals to prevent adhesions, and to insure the passage remaining widely open until the sinus has become healthier, or the discharges disappear.

3. The use of vaccines, etc., has to be considered. But in cases of streptococcal infection it is always safer to give 30 to 50 c.c. of polyvalent antistreptococcic serum immediately before operating, and follow with sensitised vaccines.

The pernasal operation is a very much less serious procedure than the external radical operation, so that one cannot fairly contrast statistics. In the first place, an operation which, at the outside, usually involves only discomfort,

no very appreciable risk, and no chance of a cosmetic deformity, is of course applicable to cases where the symptoms are altogether too slight to justify an external operation, hence the cases of internal operation cannot be fairly contrasted with those relatively rare and always severe conditions which alone justify resort to radical operation. On the other hand, a radical operation cannot be termed successful unless the nasal discharge clear up entirely; but an internal operation which overcomes the headaches and leaves the patient in good health is successful, though some amount of discharge persists, perhaps even sufficient to call for occasional lavage. And as nearly every patient who has had the internal operation described can lavage the frontal sinuses without more difficulty than is the case with a maxillary antral operation, the need for lavage is no hardship. But a large proportion of the patients lose the discharge altogether in course of time, and become as completely cured as the most successful case of radical external operation.

DRAINAGE CONTINU PAR LE GAZ OXYGÈNE.

PAR

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LE drainage dans la chirurgie abdominale à toujours été une des questions le plus discutées, chaque chirurgien ayant sa préference pour telle ou telle méthode.

J'estime à mon point de vue que les méthodes bien comprises et bien appliquées sont toutes bonnes.

Celle dont j'ai l'honneur de vous entretenir maintenant est entierement due à l'expérience de mon regretté Maitre

le Dr. Jules Chiriar [1] de Bruxelles. Elle a surtout un cachet d'originalité, en ce sens qu'elle met en jeu plusieurs facteurs qui sont le drainage de la région abcédée, son antisepsie et sa réparation plus rapide. Je veux parler du drainage continu par le gaz oxygène. Le mot l'indique, c'est un drainage constant, permanent, qui une fois installé marche pour ainsi dire automatiquement, n'a besoin que de temps en temps d'une petite surveillance, celle de l'écoulement du gaz.

Celui-ci est fourni par une bonbonne (dans la pratique on se sert toujours d'une bonbonne contenant sous pression de quelques atmosphères un millier de litres d'oxygène) à laquelle est adapté un système de tubulure avec manomètre, terminé par un écrou de réglage permettant l'écoulement plus ou moins rapide, selon le cas. Une fois la poche abcédée ouverte et vidée, préalablement bien lavée, nous y plaçons deux drains de différent calibre. Le premier, adapté à la bonbonne, conduisant le gaz est de diamètre plus petit (environ No. 8) non troué sur les côtés et ne plonge qu'a environ un cm. du fond de la poche, le second, en contact direct avec le fond, est plus gros et troué comme un drain ordinaire, court sous les draps du patient et vient finir dans un récipiént rempli d'une solution antiseptique quelconque, amenant pus, sécrétions ou debris provenant de l'abcès.

Pour assurer un bon drainage plusieurs conditions sont requises. Tout d'abord vous devez, au sortir des drains de la paroi abdominale, un tant soit peu les comprimer par votre suture, ensuite les faire traverser plusieurs compresses coupées à leur milieu d'un orifice d'un diamètre plus petit que celui des deux drains de façon à les faire servir pour ainsi dire de tampons. Les drains mis en place et bien fixés, vous réglez votre écoulement du gaz. Ordinairement, je coupe le drain destiné au gaz, plus court, de façon à pouvoir le mettre en contact au moyen d'un tube en verre avec un autre tube

[1] Professeur de Clinique Chirurgicale.

en caoutchouc fixé à la bonbonne. Pour régler l'écoulement du gaz on enlève la première partie du drain et on la plonge dans un récipient rempli d'eau. En ouvrant la bonbonne, le gaz s'écoule en bouillonnant sous une trop forte pression, mais avec la vis de réglage vous diminuez la pression jusqu'à ce que la gaz s'écoule bulle par bulle.

C'est alors le moment de l'appliquer. Quelques moments après si votre drainage est bien fait et les drains bien saisis dans la plaie et par le pansement, vous voyez dans le vase récepteur le gaz s'écouler également bulle par bulle. Comme je l'ai dit plus haut il faut de temps en temps surveiller l'écoulement et s'assurer si le drain syphon n'est pas obstrué. S'il l'était une pression plus forte aurait vite raison de l'obstacle (coagulum sang, etc.). Cette recommandation est surtout faite pour le début du drainage. Ordinairement je ne le laisse en place plus longtemps que 48 heures. Le resultat est obtenu. Vous pouvez enlever les drains et refermer la plaie par quelques fils laissés à demeure. Ceci m'amène maintenant à vous parler de l'action tant mécanique que physiologique du gaz oxygène. L'écoulement du pus par le drainage n'est pas toujours chose facile c'est pourquoi, du reste, l'on place le drain dans les parties déclives de la région abcédée, de même que le patient est couché dans une position favorable. Avec le système de drainage continu nous y arrivons d'une façon sure et certaine. La pression exercée par le courant d'oxygène ne permet pas la stagnation du pus, ni son contact constant avec les tissus malades, c'est pour ainsi dire une poche qui doit se vider continuellement automatiquement. De ce fait vous obtenez rapidement l'assèchement des parties abcédées. En second lieu les observations faites par le Professeur Herman Jooris, Attaché à la Clinique Chirurgicale comme Directeur des Recherches bactèriologiques, ont montré l'action bienfaisante, rapide, éfficace de l'oxygène sur la phagocytose, sur la transformation

des sérosités, sur son action tonique et sur son activité de réparations des tissus altérés. Du reste pour confondre certains confrères incrédules et montrer, preuves en mains, la grande éfficacité de l'action oxygénée sur la phagocytose, des expériences des plus concluantes sur des lapins et des cobayes injectés, ont été faites avec d'autres gaz ; tel que l'Hydrogène et l'acide carbonique. Les premiers effets, c'est à dire l'ecoulement mécanique du pus se faisaient sentir aussi bien qu'avec l'oxygène, mais l'aspect des liquides, des tissus, de même que l'examen bactériologique démontraient d'une façon irréfutable, l'inefficacité de ces deux gaz sur les éléments phagocytaires d'une part, et la supériorité non douteuse, tonique et vivifiante, du gaz oxygène d'autre part. Combien de fois aussi n'avons nous pas vu de ces volumineux abcès, profondément situés, drainés de cette façon, ne donner apres 24 heures que quelques légèrs suintements séreux qui nous permettaient d'enlever les drains, de refermer la plaie et d'avoir une réunion *per primam*. L'appel leucocytaire, à mon avis, joint à l'action mécanique de l'oxygène sont les grandes causes de réussite de cette méthode.

En effet, nous réalisons une antisepsie organique, nous mettons les tissus continuellement en contact avec une atmosphère régénératrice, en état de se défendre d'une façon magistrale et surtout ne subissant plus le voisinage de ce pus expulsé constament et facilement. Ici ouvrons une parenthèse et permettez-moi de vous citer quelques cas parmi tant d'autres. Je me souviens d'un cas d'appendicite phlegmoneuse avec gangrène de l'appendice, dont le résultat final à été merveilleux. Le malade était dans un état de septicèmie profonde, telle que quelquefois nous les voyions auparavant après les traitements médicaux infructueux, délire, pouls filant, rapide, facies tiré, température basse, ventre atonique, rétracté, enfin bref tous les symptômes d'un rapide dénouement. À l'ouverture, écoulement d'un pus

fêtide, sanieux, rougeâtre fusant le long du colon ascendant. Après contre-ouverture lombaire j'applique le drainage continu. Contre mon attente le soir le malade revenait pour ainsi dire à la vie.

Le lendemain facies, pouls, température etaient meilleurs, tout indiquait déjà une desintoxication. La sérosité s'était transformée en pus de bonne nature.

Pendant 3 jours je lui ai laissé le drainage. Une quinzaine de jours après le malade quittait l'institut, la plaie en bonne voie de cicatrisation.

Laissez-moi vous citer un cas de phlegmon du ligament large. À l'examen on constatait une tumeur véritablement encastrée dans le bassin à gauche, non fluctuante, dure, ligneuse, fortement douloureuse. Incision mediane faite, impossibilité complète d'extirper la tumeur. J'incise le long de son grand axe et après nettoyage de la poche, drainage, suture des parois abcédées, et contre-ouverture latérale pour permettre la sortie des drains. Deux jours après je pouvais franchement les enlever.

La guerison à suivi le cours régulier d'une opération aseptique. Un autre cas encore d'abcès extrapéritonéal, suite d'accouchement ayant nécessité des manœuvres très laborieuses. Pratiquement le drainage se fait par la voie abdomino-vaginale et toujours demande un temps très long pour la guérison et l'asséchement parfait des parties abcédées. Après ouverture latérale et grand lavage, j'ai simplement drainé par l'abdomen sans ouverture vaginale, le résultat à été le même, aussi heureux aussi rapide que pour les autres interventions.

Par ces quelques cas qui me reviennnet à la mémoire, j'ai voulu vous montrer la grande simplicité d'application de cette méthode, non dangereuse, non douloureuse, et les beaux résultats que l'on peut obtenir.

AN OUTBREAK OF INSTITUTIONAL DYSENTERY DUE TO THE Y. BACILLUS.

BY

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AND

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AT the close of last year there was an outbreak of epidemic diarrhœa at the Stapleton Workhouse. It commenced about the middle of November, reached its height at the end of December, and gradually receded during the closing days of January. In all, some forty persons were attacked, of whom five died. The first case was that of a man, S., who had been working in connection with Colonial troops on Salisbury Plain. He was admitted to hospital ward on November 23rd, and had recovered sufficiently to be discharged on December 2nd. During this time one of the nurses attending him was transferred to a female ward. Five days later the inmates of the female ward showed signs of the same condition, and the whole of the patients and the ward staff were in turn infected. Four visitors to the ward suffered similarly. One of the nurses went to her home on a visit. Four days later her father and a relative were taken ill. One of the patients from the same ward entered a home in Clifton. Several days passed without remark, then four other servants were prostrated with dysenteric evacuations. After this there was a lull of fourteen days, succeeded in turn by a final outburst of some twelve cases.

The following brief clinical histories may be of interest :—

Case 1.—On November 23rd a middle-aged man (a groom), S., was admitted to the casual wards with a history of diarrhœa and blood in his stools. He had felt ill for a week. He was kept under observation, and showing no signs of improvement

was transferred to a male ward in the Workhouse Infirmary on November 24th. He had been working on Salisbury Plain for some time, digging trenches, and attending to horses in the Canadian lines. He is an habitual tramp, and visits these wards about once in a month, and as a rule is clean and tidy in his appearance, but on this occasion was unkempt, and had vermin on his hair and clothing. For the first twenty-four hours he had several very loose stools with a greenish scum, and much blood and slime. He was given a large dose of castor oil, and on the third day he was much relieved and the diarrhœa was stopped. He took his discharge on December 2nd, apparently well. The night nurse in this male ward was M. On November 28th she was transferred to a ward containing about twenty-two old ladies, whose ages varied between sixty and ninety years.

Case 2.—On the evening of December 4th an aged woman, B., suddenly collapsed while I was in the ward. During the day she had passed five very watery stools with some blood. She revived with difficulty, and remained very ill up to December 9th, without any further loose stools or bleeding.

Case 3.—An aged woman, W., on December 8th was seized in the same way, and did not recover until December 10th.

Case 4.—On December 9th an aged woman, L. i., with a huge ventral hernia, was suddenly taken ill. Temperature 102.2° F., pulse 160, respiration 36, frequent vomiting, numerous offensive stools containing blood and mucus. I at first considered that it might be a gastric form of influenza, as there was a good deal of ordinary influenza in the hospital. During the next four days the condition continued, and the stools changed to a greenish colour. She died on December 14th.

Case 5.—On December 12th another aged woman, L. ii., had loose stools, offensive and bloody. The bowels were thoroughly washed out with saline solution. On the 17th she collapsed, the stools became of a dark chocolate colour, and she died on December 18th.

Case 6.—E., who also had a huge ventral hernia, started her attack on December 13th, and for the first three days her temperature was normal, although the stools were copious, slimy and bloody. She apparently had a second infection on the 16th, and began to vomit; her temperature rose and the motions were green. She died on December 21st.

Cases 7 and 8.—Nurses N. M. and N. W., who were in the ward, both had much pain and frequent stools with slight hemorrhage.

Case 9.—Nurse N. W. went home for a day into the Midlands to see her relations, and three days later her father had a severe attack of dysentery and was ill for several days.

Cases 10 and 11.—The Chaplain and his wife both visited this ward on December 20th, and spent some time with the old people, especially with E. The Chaplain's wife had a severe dysentery five days later, and the Chaplain a lesser attack in three days after that.

Case 12.—H., an aged woman of ninety, had diarrhœa on the 15th, with a temperature of 101.8° F. The stools contained blood on the 16th. On the 20th they showed an excess of mucus and were dark in colour, becoming subsequently definitely green. She died on December 22nd. Pulv. ipecac. gr. 60 was given twice.

Case 13.—The wardswoman, W. ii., aged 46, had loose stools with blood on the 17th. She had frequent lavage for six days, and she made a good recovery. Her bowels were not opened for seven days after. She had some jaundice.

Case 14.—A comparatively new admission, R., with a previous history of rheumatism and heart failure, had sudden loose stools on the 16th. Suppression of urine followed, and she collapsed on the 23rd.

Case 15.—B. ii., aged 90, became ill on December 18th, vomited a greenish yellow fluid. She was very jaundiced. Temperature 96.6° rising the next day to 100.2° F., and blood appeared in her stools. With pulv. ipecac., and frequent saline irrigations, she began to improve, and on December 28th passed a formed stool.

Case 16.—L. iii., a case of cerebral hemorrhage, was admitted and remained comatose for five days. She was fed with milk with the greatest difficulty. On the 19th she passed three loose and offensive blood-tinged stools. This condition continued on and off for several days. She was maniacal and noisy. After two injections of gr. $\frac{1}{3}$ emetine the diarrhœa ceased and her mental state appeared normal.

Case 17.—B. iii., a case of neuritis, had dysenteric stools for three days.

Case 18.—L. iv. had a severe dysentery for two days and then recovered.

Case 3.—W. had apparently a second infection on January 1st. Temperature 100° F., numerous dark stools followed by definite hemorrhage. On January 2nd a large intestinal cast (9 inches) was passed. She died on January 8th.

From December 12th special precautions were taken in this ward, and nurses and patients were isolated. The lavatories were specially disinfected, and all bedding soaked in carbolic solution 1 in 20, before being transferred to the

laundry. Special instructions were issued to the nurses with regard to their hands and dresses. About this time I communicated with the Medical Officer of Health, Dr. D. S. Davies, after a negative Widal reaction had been obtained in the case of B. iii. He kindly visited the wards, and advised that bacteriological examinations should be made of the blood and stools of some of the patients. These were carried out by one of us (I. W. H.).

Cases 19 to 26.—On January 28th I was informed late in the evening that seven day nurses, including N. M., had been seized with abdominal pain and violent diarrhœa. They were treated with brandy and port wine, morphia and capsicum. One nurse had a temperature of 99° F., the temperatures of the others were below 97° F. They were collapsed and in great pain. I saw them once during the night, and except for one with temperature 99° F., they were all on duty the following day. This nurse had diarrhœa and abdominal pains for three days with increased temperature and dysenteric stools.

Case 27.—The superintendent nurse had diarrhœa and colicky pains for three days, but she had had colitis more than once before. I think her case was functional, and possibly the same remark may apply to two junior nurses who were diarrhœic the next day. All these nurses had eaten some mince pies for dinner, but others had consumed portions from the same lot and were not ill.

Cases 30 to 31.—On January 11th a senior official of the Institution passed ten stools in two hours, and several more sixteen hours later. The diarrhœa then ceased.

A visitor to his house was attacked similarly on January 13th.

Case 32.—Nurse L. had a severe attack on January 14th. She was ill for three days with typical stools.

Case 33.—On January 12th S., in dysentery ward, had an attack. She recovered in two days.

Case 34.—B. iv., who cleaned the knives and forks and silver in the kitchen of the hospital, was taken ill with dysenteric stools containing much blood.

Case 16 had another relapse after eating currant cake, surreptitiously given her by a friend.

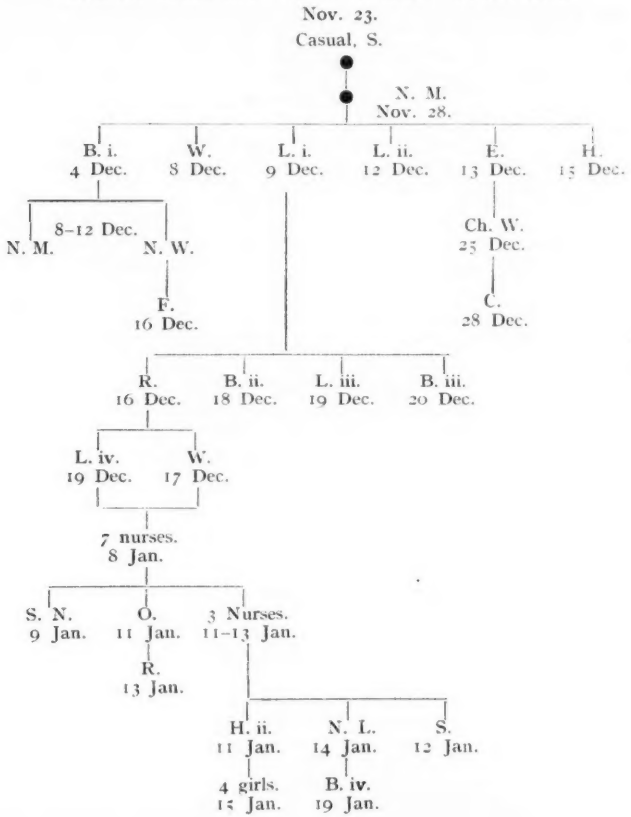
The Chaplain's wife had another relapse.

The other pat ents in the ward had been in ordinary health.

The same two day nurses, N. M. and N. W., have been in charge of the cases during the outbreak.

A patient, H. ii., who left this ward on January 7th, having refused to stay any longer, returned on January 26th with the following history: On leaving she went to a home for servants in Clifton. For four or five days after leaving here she was in bed for three days with acute diarrhœa. Three days later four other girls in this same house were taken ill with blood and slimy motions and severe pain. They put it down to the drinking water, although the head of the home was informed by the patient of what had occurred in Stapleton.

SCHEMA SHOWING THE VARIOUS INFECTIONS.



Bacteriology.—Bacteriological examinations were made when the outbreak was well established. After an incubation period of about four days the stools contained pus, blood and mucus for about a week in the severe cases. Amœbæ were not present.

Upon isolation (see Table No. II., Cases 1 and 2) streptococci and anærobes were not more numerous than usual. The strain of the bacillus coli present was slightly abnormal, in that it fermented lactose more slowly than average strains. Typhoid, paratyphoid, cholera and Morgan's bacilli were not present.

An organism was isolated from the mucous strands which exhibited the following characteristics :—

It grew well on ordinary media at 22° C. and 27° C., both anaërobically and aërobically. It proved to be a non-motile, non-sporing, gram-negative rod, which did not exhibit any chromatin granules. It was small and slender, and did not show pleomorphism nor any special arrangement.

On solid media it formed colonies which were at first round and translucent, and later presented irregular margins, and a creamy, non-granular centre. In streaks the film was translucent and finally creamy.

Anaërobically, in stab cultures it yielded a slightly granular growth without projections.

Gelatine was not liquefied.

It fermented glucose, lævulose and mannite, without the formation of gas. Litmus milk was turned alkaline after seventy-two hours without being clotted. Maltose, galactose, arabinose, raffinose, lactose, saccharose, sorbite, dulcite, adonite, dextrin, starch and inulin were not fermented.

It was not agglutinated by standard Shiga or Flexner serum, but was agglutinated by standard Y. serum in a dilution of 1 in 3,000. The titre of the standard was 1 to 3,200.

Indol was not formed in suitable peptone water.

Nitrates were reduced.

Nitrites were also reduced in accordance with the work of Logie.

Inoculation.—The bacillus appears to be one of low virulence. Two standard loopsful of an agar culture were injected into a guinea pig without producing any effect. One-sixth of an agar culture failed to kill another guinea pig, but induced the formation of a local abscess near to the seat of the injection. The pus present in the abscess contained a few bacilli, and permitted a feeble growth upon transference to a veal broth medium. Cultures made from the heart blood were negative. The blood of the second guinea pig agglutinated the bacillus 1 in 125, and also an organism obtained from a second specimen of fæces (Waite's), but did not agglutinate Flexner's or Shiga's bacilli. It was without effect on any of the associated organisms recovered from the other cases described in connection with the outbreak.

A white mouse survived an injection of three loopsful of an agar culture for over a week.

The morphological, cultural, biochemical and inoculation characters exhibited by the organism allow of its identification as the Y. bacillus of dysentery described by Hiss-Russell.

The blood of the patients were examined for the antibody content as follows :—

Agglutinins.—Serum obtained from the patients was tested against the bacillus and against coli, coliform and streptococcal organisms isolated from the fæces received, and also upon stock cultures of Shiga and Flexner dysentery bacilli. The following are the results :—

TABLE I.

	Agglutination.
Bacillus isolated from stool	1 in 125.
Patient's own B. coli	no agglutination.
Patient's own coliform organisms ..	do.
Patient's own streptococci	do.
Shiga's bacillus	do.
Flexner's bacillus	do.

Absorption experiments were performed, and it was found that the whole of the agglutinins were removed by the bacillus isolated in the fæces. After the removal of these specific agglutinins, the supernatant fluid agglutinated the patient's B. coli and a stock B. coli in a dilution of 1 in 20, but was without effect on the coliform organisms, streptococci, Shiga's or Flexner's bacilli.

Complement Deviation.—The deviation of complement could not be obtained even with large doses of the patient's serum, when antolysed emulsions of the Y. bacillus, Flexner's bacillus, and Shiga's bacillus were used as antigens.

The organisms present in the stools from which the B. dysenteriæ could not be isolated exhibited certain features worthy of comment (see Table II.). The Pyocyaneus bacillus was present in the case of M. L.; it may have been simply an associated factor. Green pigmentation of the stools was noted in all the fatal cases. In the other cases non-motile bacteria were obtained, which gave reactions indicating their relation to the Dysentery group; none, however, were sufficiently definite to be considered as identical with the Y. bacillus.

The agglutinative powers show a correspondence with the stage of the condition and the time of the removal of the blood (see Tables I. and II.). The short period of persistence is in agreement with the slight intensity of the attack, for

TABLE II.

CASES.	Date of attack.	FAECES.		BLOOD.		
				Agglutination.		
		Microscopical.	Bacteriological.	Own organisms other than Bacillus Y, Jan. 20, 1915.	Bacillus Y.	
					Jan. 20, 1915.	Feb. 2, 1915.
				(Dec. 15.)		
1. B. ..	Dec. 13	Dec. 19—Pus. Mucus. R.B.C.	Bacillus Y	1/20	1/125	—
2. S. W.	Jan. 1	Jan. 8—Pus. Mucus. No R.B.C.	Bacillus Y ..	1/20	1/50	—
3. M. L.	Dec. 19	Jan. 10—No pus. No mucus. No R.B.C. ..	No Bacillus Y	0	0	0
4. L. ..	Jan. 14	Jan. 23—No pus. No mucus. No R.B.C. ..	No Bacillus Y	0	0	0
5. E. B.	Jan. 19	Jan. 23—No pus. No mucus. No R.B.C. ..	No Bacillus Y	0	0	0
6. S. ..	Jan. 12	Jan. 23—No pus. No mucus. No R.B.C. ..	No Bacillus Y	0	—	0
7. W.	Dec. 17	Jan. 23—No pus. No mucus. No R.B.C. ..	No Bacillus Y	0	1/50	0
8. B.	Dec. 20	Jan. 23—No pus. No mucus. No R.B.C. ..	No Bacillus Y	0	1/125	0
9. M.	Nov. 28	Feb. 16—No pus. No mucus. No R.B.C. ..	No Bacillus Y	—	1/50	—
10. W.	Dec. 8	Feb. 16—No pus. No mucus. No R.B.C. ..	—	—	—	—

TABLE III.

OTHER BLOOD EXAMINATIONS.

Cases.	Attack Date.	*Agglutination*, Feb. 1st, 1915.		
		Bacillus Y.	Bacillus Dysenteriæ (Shiga).	Flexner.
B.	Jan. 8	0	0	0
J.	Jan. 8	0	0	0
G.	Dec. 20	0	0	0
N. M.	Dec. 20	0	0	0
N. W.	Dec. 20	0	0	0
B. i.	Dec. 4	0	0	0
O.	Jan. 11	0	0	0

although the attacks proved fatal to a few old people, those previously in good health showed no permanent after-effects (see Tables II. and III.).

From a consideration of the clinical histories, the low virulence of the organism concerned and the agglutinative reactions obtained in those cases in which the Y. bacillus was not demonstrable in the stools, it is permissible, perhaps, to assume that this Y. organism was the chief factor in the causation and spread of the infection. The fact that in more acute cases the dysentery bacillus may disappear at an early stage of the condition and be replaced by local organisms, strengthens the supposition.

Unfortunately, owing to his renewal of tramping, it was impossible to obtain for examination a specimen of the fæces of the supposed original introducer of the organism to the workhouse precincts. However, on March 24th he passed through Bristol, and the opportunity was taken to determine his agglutination titre for the Y. bacillus. It was found to be 1 in 20.

It will be noted that there was an interval in the attacks extending from December 20th to January 8th. In order to

determine the cause for the recrudescence of the attacks in January, and with a view to eliminate the possibility of any further transmission, the stools of intermediary "carriers" and of those recovered from the infection have been examined (see Table II., 3 to 10). The Y. bacillus has not been obtained from any of them.

Progress of the Medical Sciences.

MEDICINE.

The Colloidal Gold Reaction in the Cerebro-Spinal Fluid.—Lee and Hinton[1] form a very favourable opinion of the value of this test, originally described by Lange, in syphilitic conditions of the nervous system. The theory of the reaction is based on the following observations: (1) Solutions of electrolytes precipitate colloidal gold; (2) proteins in the absence of an electrolyte also precipitate a solution of colloidal gold; (3) proteins in the presence of an electrolyte inhibit precipitation in colloidal gold solutions.

Lange's theory is (1) that substances in pathological spinal fluids will precipitate colloidal gold, provided the globulin and nucleoprotein fractions are held in solution with a 0.4 per cent. sodium chloride solution, and (2) that there is a characteristic change for certain diseases involving the central nervous system. The technique is fairly simple, and is described in detail in this paper, and also in another communication by Miller and Levy.[2]

Lee and Hinton investigated 100 consecutive cases, and compared the results they obtained by this method with the clinical diagnosis and other laboratory tests. They found that the gold reaction was not always parallel with the blood Wassermann reaction, the spinal fluid Wassermann reaction, the globulin test, or the cell count, but that it was apparently more constant in syphilitic affections than any of the other tests. The gold reaction typical of syphilis occurred only twice in the absence of blood Wassermann reaction, spinal fluid Wassermann reaction, cell counts, and globulin tests. In both these cases the gold reaction was confirmed by clinical diagnosis. The gold reaction usually occurs, in combination with a positive finding in one of the other tests, but there is no constant association between this test and any one of the other tests. They found the blood Wassermann reaction present in only 43 per cent. of the cases diagnosed as syphilis of the central nervous system, and

both blood Wassermann reaction and spinal fluid Wassermann reaction absent in 24 per cent. of the cases of presumable syphilis of the central nervous system. A negative gold reaction was obtained in two cases diagnosed as syphilitic. One of the advantages of this test is the small amount of cerebro-spinal fluid required, viz. 0.2 c.c.

These authors regard the test as more delicate than any of the other laboratory tests, and consider that it is nearly always present in cases of syphilis of the central nervous system. Moreover, the test has the further advantage that it gives reaction with pathological spinal fluids other than those of syphilis, which are characteristic and easily differentiated from that due to syphilis.

Miller and Levy [2] having examined 171 cases by this method, and having also in every case carried out a blood Wassermann reaction, cerebro-spinal fluid Wassermann reaction, cell count and globulin test, reached the following conclusions:—Normal cerebro-spinal fluids give negative reactions. The test can be performed rapidly with a minimum amount of cerebro-spinal fluid. Extreme care is, however, required in the preparation of the reagents. It has no advantage over known laboratory methods in the diagnosis of congenital syphilis. It is of no help in the diagnosis of tubercular and purulent meningitis. Reactions in secondary and tertiary syphilis are inconstant, and their significance when present is not known. The statement that they indicate the earliest stages of involvement of the central nervous system lacks proof. The positive reactions in the majority of cases of tabes and cerebro-spinal syphilis are not characteristic. The authors feel, however, that the reaction peculiar to paresis is sufficiently constant to warrant its use as an aid in the differentiation of this condition from others with which it might be confused. It is possible that the test may prove to be more sensitive than are those at present employed as an indicator of the results of specific therapy in syphilitic disease of the central nervous system. Much may be expected from the application of colloidal chemistry to the study of biological problems.

The Sympathetic Nervous System and the Gastro-Enteric Functions.—The influence exerted by the sympathetic nervous system on the functions of the stomach and intestines has been brought into much greater prominence by work done on the sympathetic and autonomic systems during the last ten years. C. S. Fischer [3] says that the great majority of digestive disturbances start as functional defects, many of which exert their influence through the nervous system. Fifty per cent. of the gastric acid secretion is due to psychic-nervous influences, and psychic causes are often the controlling factors in the determination not only of the character but of the organic development of

digestive diseases. The physiological and anatomical investigations of Gaskell and Langley have thrown much light on the sympathetic nervous system, while those of Eppinger and Hess have elucidated the pharmacological and clinical aspects. Fischer attempts in his paper to focus attention on these points, and to reduce the facts which are already known to a practical working basis. These facts are of as much importance as the size, shape, position and acidity of the stomach. It should be possible in any given case to determine the reactional trend of the sympathetic nervous system. In a field so comparatively new many problems are, however, still unsolved. The whole sympathetic system is divided into (1) the sympathetic nervous system proper, and (2) the autonomic system. These two systems are antagonistic in their directing influence, and endeavour to maintain a normal balance of function in the structures they control. Good descriptive accounts of the anatomy of these systems, with special reference to points of clinical importance, have recently been published by Fischer,[3] Kinnier Wilson[4] and Elliott[5]. Fischer describes the whole sympathetic structure as a system with four stations: first, the central station, consisting of brain and spinal cord; second, the station consisting of the lateral or vertebral ganglia; third, the station consisting of the collateral ganglia (cervical stellate, epigastric, superior and inferior mesenteric, etc.); fourth, the terminal station in the viscera.

Any impulse starting in the central station may be interrupted and divided either in the lateral or collateral stations. An impulse, however, coming from the periphery may never reach the central station, but may be diverted at the lateral or collateral ganglia, *e.g.* an impulse beginning in the colon and reaching the stomach would pass first to the superior mesenteric ganglion, thence to the epigastric ganglion, and on to the stomach. In this example the lateral ganglia are not affected. The frequency with which colonic affections react on the secretion of the stomach may thus be partially explained, which is of importance in considering the remote effects of chronic appendicitis and ascending colonic stasis. By means of the collateral ganglia all parts of the alimentary canal are so intimately connected that almost any reflex is possible. Impulses from more distant parts must pass by a more circuitous route, and impulses from the gastro-intestinal tract to other organs must pass through two or three stations at least. Thus a reflex from the intestine to the heart must pass *via* the collateral, lateral and stellate ganglia; those from the intestine to the skin (Head's areas) by the collateral and vertebral ganglia. With a working knowledge of these routes, etiologically obscure local abnormalities of function will often be explained by tracing the same to some distant point of unsuspected

importance. This is particularly true if there coexists a hyperexcitability of the sympathetic system. Any influence which stimulates the system diminishes the movement and inhibits the secretory activity of the gastro-intestinal tract from the mouth to the anus. If this influence could be complete and uncontrolled, there would result a general paralysis of the tract, without secretion or motion. On the other hand, any influence which leads to depression of the system leads to stimulation of secretory and motor function.

With extreme hyperstimulation of the system there would result a dry mouth with deficient ptyalin activity, paralysis of the muscular structures of the œsophagus, leading to difficult deglutition, impaired passage of food, and idiopathic dilatation. The cardiac orifice of the stomach would be relaxed, leading to rumination and eructation. In the stomach there would be subacidity, achylia, atonic dilatation, with bloating and pressure. The pyloric sphincter would be relaxed, with backward flow of bile and pancreatic secretion. Lack of tone of the common bile duct would lead to constant discharge of bile into the duodenum and urobilinuria. In the small intestine there would be delayed passage of food and delayed digestion, leading to flatulency, deficient absorption and general malnutrition. The large intestine would be atonic, resulting in stasis, fermentation, decomposition, autointoxication, and chronic appendicitis. In the lower portion of the colon fæcal impaction, possibly mucous colitis, rectal pressure and hæmorrhoids. Interference with the return circulation from the bowel would lead to symptoms of head pressure, vertigo and insomnia.

The ability to recognise the possibility of sympathetic influence as an etiological factor will guard against many false diagnoses. Signs and symptoms are present in most cases, though they are generally neglected.

The dominating native stimulant for the sympathetic proper is adrenalin. The cells of the sympathetic ganglia are derived from the same embryological source as the adrenalin-producing cells of the suprarenal capsules (chromaphil tissue). The normal amount of adrenalin in the blood is one to one hundred million parts. Diminution of this leads to muscular weakness, bronzed skin, loss of tone of the blood vessels, contracted pupil. Excess leads to contraction of the blood vessels, increased contractile force of the heart, dilated pupil, decreased gastro-intestinal motility. Extirpation of the pancreas leads to excessive activity of the chromaphil system. Emotional disturbance leads to an excess of adrenalin secretion. According to Elliott, adrenalin cells are present wherever there are blood vessels, and in some examples they seem to usurp entirely the prerogative of the sympathetic nerves. Fighting power, he says, rises with the rise of the blood pressure, reserves of sugar to feed the

muscles are hurried up from the liver on the call of the circulating adrenalin, the daily routine of digestion is checked by intestinal inhibition. He further adds that by that curious antithesis of the emotions upon which Charles Darwin laid stress, the machinery employed to prepare for fight may, with the cowardice of civilisation, be set as powerfully in motion only to express fright. And in this the adrenalin is equally or perhaps even more exhausted. The secretory nerves for adrenalin are incorporated in the splanchnics. Hemmeter proposes the hypodermic injection of 0.00015 gram of adrenalin as a test of sympathetic hypersensibility, since this dose will, under such circumstances, produce the same effect as 0.0005 gram in an average case. This test should, however, be used with very great caution, and Loewi's test, which is comparatively safe, should be used instead. If the test is positive, marked mydriasis follows the instillation of one drop of 1 in 1000 adrenalin solution into the eye. When many of the symptoms of excessive sympathetic stimulation are present, the condition is described as sympathicotonia.

Through this system the influence of the emotions plays a most important part in gastro-intestinal diseases. Fischer claims that the great majority of cases in gastrological clinics are indefinite cases with either hyper- or hypo-functional activity secondary to perverted sympathetic influences, though it is often difficult to find where the trouble started. Although there is much evidence that the sympathetic system is connected with the higher cerebral centres by both afferent and efferent fibres, he does not consider that there is any direct relationship between the actual qualitative and quantitative characteristics of the gastric functions in any emotional states.

J. R. CHARLES.

REFERENCES.

[1] *Am. J. M. Sc.*, 1914, cxlviii. 33.
[2] *Bull. Johns Hopkins Hosp.*, 1914, xxv. 133.
[3] *Med. Rec.*, 1915, lxxxvii. 127.
[4] *Brit. M. J.*, 1913, i. 1,257.
[5] *Ibid.*, 1914, i. 1,393.

SURGERY.

Sarcoma of the long bones.—This interesting subject has recently been reviewed by Coley[1] in a communication of great value. The illuminating discussion at the Royal Society of Medicine in November, 1912, furnished him with some interesting statistics, but the greater part of the paper is founded on the author's personal experience.

He refers to the gloomy statistics brought forward by Gask at the discussion referred to—that, out of twenty-five cases of

[1] *Ann. Surg.*, lx. 537, *et seq.*

periosteal sarcoma of the femur, not one was alive at the end of three years, and only one had failed to recur at the end of eighteen months. In eight humerus cases, all ended fatally within the three-year limit. Of the twenty-eight St. Thomas's Hospital cases, all were dead within the same time.

The dismal fact is apparent, that, in spite of new aids to early and accurate diagnosis, the results are no improvement on those of Butlin of a generation ago, the ultimate prognosis in cases of periosteal sarcoma being still practically hopeless.

Coley claims for his cases considerably improved results, giving as his reason, not earlier diagnosis—for many of the cases were inoperable when first seen by him—but the use of his mixture of the toxins of Bacillus Prodigiosus and Streptococcus Erysipelatis.

The author protests against the traditional treatment (possibly one might say that "obsolescent" would be a fairer word to use than "traditional") of all cases of sarcoma of the long bones by immediate amputation. He holds that every case should be subjected to a two or three weeks' course of injection of the mixed toxins, and only in the event of no improvement manifesting itself should operation be undertaken. To the obvious objection to this plan, that to wait two or three weeks to see the effect, if any, of toxin treatment may be waste of valuable time, he replies that in any case which cannot wait three weeks, amputation is a hopeless proceeding and scarcely worth undertaking.

On the other hand, in a proportion of cases—admittedly probably a small one—the limb will be saved by the toxin treatment, and, in any case, it will enhance the prospects of final success in the shape of freedom from recurrence after amputation or other operative procedure.

The author gives details of twenty-seven cases successfully treated. In eleven the limb was saved. Many cases did not react to the toxin treatment, therefore amputation was undertaken, followed by a further course of injections, and no recurrence followed.

Space forbids mention of the many interesting cases cited, and one striking instance must suffice. The case was one of a large periosteal sarcoma of the femur in a man of 19 years, with widespread metastases in pectoral and ilio-lumbar regions. Hip-joint amputation had been advised and refused. After a two months' course of injections, all trace of the diease disappeared, and the patient remained well for ten years. He then developed in the skin of the thigh at the site of an old X-ray burn a very highly malignant tumour, "epithelioma and sarcoma combined," which proved fatal.

As to diagnosis, the main subjective symptom is deep-seated, boring pain, worse at night or after use of the limb. When,

later, a palpable tumour develops, local heat is often present, and the patient's temperature may rise to 101–102°.

Reference is made to the theory, originated by Eve, that the difference in nature of myeloma and sarcoma depends on the site of the disease rather than on the structure of the tumour—the nearer the trunk the greater the malignancy is true of myeloma as well as of periosteal sarcoma. Coley thinks this is by no means universal, and quotes one of the most malignant cases he has ever met with, a periosteal sarcoma of the meta carpus. He dissents also from the opinion, commonly held, that a myeloma is necessarily only locally malignant and not associated with metastatic deposits, giving cases to support his contention.

Differences in the course of such cases may be due in many instances to difficulties in making the pathological diagnosis, instances having often occurred in which pathologists of very great experience have been in error.

Going on to refer to the value of X-rays in diagnosis, Coley utters a warning that considerable experience in interpreting skiagrams is essential if errors are to be avoided. The X-rays, at best, are subject to limitations. For instance, they show little or no difference between a primary sarcoma of the shaft of a bone and a carcinoma secondary to disease elsewhere.

He utters a word of warning against the indiscriminate use of exploratory incision as a means of establishing the diagnosis, valuable as it is in suitable cases. It is liable to lead the surgeon and pathologist into serious error, owing to the incision not having been carried sufficiently deep, and thus not including a typical part of the tumour. Other obvious dangers are the risk of dissemination of the growth, and the liability of causing sinuses, which do not heal. Some situations are especially unsuitable for this method of investigation, notably the popliteal region of the femur. When the tumour is cut into, a certain opinion as to its malignancy can generally be given from naked-eye appearance alone.

The author quotes with approval Makins's opinion that no sarcoma of long bones should be cut into unless the surgeon is prepared to amputate, if necessary, within twenty-four hours.

In cases in which clinical and pathological evidence differs, Coley agrees with Corner that the clinical evidence is the more weighty. In many cases of error in pathological diagnosis the fault is the surgeon's, in not cutting deep enough, and so supplying the pathologist with a piece for section which is not typical. He goes on to refer to the varying malignancy of cases of chondrosarcoma, ranging as they do from the lowest to almost the highest. They should always be regarded with grave suspicion.

The whole paper is a most interesting and instructive one.

While most British surgeons are unable to endorse entirely Dr. Coley's enthusiasm for treatment by the toxin method, few will have failed to come across a case or cases in which it undoubtedly helped to save life or limb from the ravages of this terrible disease.

C. A. MOORE.

DISEASES OF CHILDREN.

B. coli infections in infancy and childhood.—The effects of the *B. coli* and its toxins on the organs affected and the symptoms resulting are so diverse and misleading, that a study of some of the more recent literature on the subject is of very great importance from the clinical standpoint. Hartshorne[1] quotes cases of invasion of the *central nervous system* in children by the *B. coli*, causing a meningitis clinically indistinguishable from other forms of meningitis. In these cases, mostly young babies, the colon bacillus has been grown in pure culture from the cerebro-spinal fluid. The condition was secondary to inflammation of the navel or bladder, otitis media, or spina bifida. Gordon[2] points out that in cases of coliuria in children the symptoms are not always associated with the urinary tract, but may simulate intracranial disease, especially meningitis, the onset being ushered in by convulsions, rigidity, and strabismus, and in some cases Kernig's sign may be present. I have recently had such a case under my own care, where meningitis was suspected, the cerebro-spinal fluid was clear and under considerable pressure, but contained no organism. A thorough examination of the urine, however, revealed coliuria, and when that condition was treated, all the other symptoms cleared up.

Respiratory System.—The *B. coli* is rarely the sole cause of inflammatory processes in the respiratory system. Pearson[3] reports a case of empyema, following bronchiectasis and pleurisy, in a boy aged seven years, where *B. coli* was found in pure culture in the discharge. In cases of coliuria the symptoms may suggest the onset of pneumonia, which, however, soon abate with the recognition of the urinary condition and the adoption of proper treatment.

Intestinal Tract.—The colon bacillus is always present in the intestinal tract, with the possible exceptions of (1) the condition known as the intestinal infantilism of Herter, and (2) for a few days in the newly born. It has not been proved that the colon bacillus, *per se*, is responsible for the many forms of intestinal disturbance in young children, though in cases of coliuria signs of abdominal disturbance, including vomiting, constipation, and sometimes diarrhœa, may be the only obvious symptoms present.

[1] *Med. Rec.*, 1914, lxxxvi. 288. [2] *Brit. J. Child. Dis.*, 1914, xi. 252.
[3] *Brit. M. J.*, 1909, ii. 78.

Urinary Tract.—These cases present far less difficulties in diagnosis, as the symptoms at once call attention to the affected system. The *B. coli* may be found in cases of enuresis, cystitis, pyelitis and pyelonephritis. The high acidity of the urine is usually responsible for the bladder symptoms, and there may be pain in the kidney region, usually the right. The mode of infection in these cases is not always the same; in girls it is usually an ascending infection, in boys transparietal; while in both sexes it may be by the blood.

All these various symptoms are doubtless the result of the circulation of toxins formed by the bacilli, which are in most cases neutralised by alkaline treatment, though alkaline treatment is not usually sufficient of itself to cause the disappearance of the bacilli from the urine. That such divergent symptoms should arise from the same cause only emphasises the necessity for thorough microscopical and bacteriological examination of the urine in all doubtful cases of illness in young children.

Nervous Cretinism.—McCarrison[1] describes this condition as a combination of infantile myxœdema (cretinism) with congenital cerebral diplegia in all their varying grades. Usually it is easy to distinguish the well-known signs of cretinism, but there are instances in which these signs are almost wholly wanting. The nervous symptoms may vary from the slightest degree of paraplegia to the most intense degree of spasticity, athetosis, fits and idiocy. Such extreme examples of this condition may be indistinguishable from cases of "cerebral diplegia," and it is only by the recognition of the scanty myxœdematous signs of the malady, and the application of the therapeutic test of thyroid medication, that their true nature can be appreciated. McCarrison is of opinion that the markedly beneficial result of thyroid medication is a clear indication that cases of this kind, which are not due to other obvious cause of cerebral diplegia, are often the results of thyro-parathyroid disease. The experimental work of Edmunds[2] shows that the effect of thyroidectomy in animals is such as to cause changes in the central nervous system, consisting of "chromatolysis of the cells large and small, swellings of the cell bodies swelling of the nuclei, extension of the nucleus, and total destruction of the cell body, leaving practically only a free nucleus. It is clear, therefore, that the effects of athyroidism being such, cases of thyroid deficiency should be recognised early, before permanent damage has been inflicted on the neurones. The amount of benefit derived will depend on the duration of the disease prior to the commencement of the treatment.

[1] *Proc. Roy. Soc. Med.* (Sect. Dis. of Child.), 1914, vii. 157.

[2] *Tr. Path. Soc. Lond.*, 1902, liii. 343. *Proc. Roy. Soc. Med.*, (Neur. Sect.), 1912, v. 179.

Status Lymphaticus.—The extreme importance of the recognition of this disorder cannot be too strongly insisted upon, as it so often leads to unexpected and untoward results. The most constant feature is enlargement of the thymus, associated with more or less general lymphoid hypertrophy all over the body. The normal area of thymic dulness is V-shaped, and does not transgress the margin of the manubrium sterni, while in enlargement of the gland this area passes from half an inch to three-quarters of an inch to either side of the bone and below joins the cardiac dullness. If with these physical signs there is a tendency to unexplained attacks of dyspnœa, or to a persistently low vitality, as evidenced by subnormal temperatures and intolerance of exertion, the "status lymphaticus" should be suspected, and the child should not be unnecessarily exposed to the risk of an anæsthetic. Thursfield[1] is of opinion, from a consideration of recent experimental work on the thymus, that the "status lymphaticus" is not merely due to disorder of the thymus, but to a much more complicated disorder of the whole ductless gland system. He advises prior to the administration of an anæsthetic, in all cases where this condition may be suspected, the injection of pituitrin, an extract which has the most extraordinary effect in warding off shock.

E. CECIL WILLIAMS.

Reviews of Books.

Sexual Ethics. By ROBERT MICHELS. Pp. xv, 296. London: The Walter Scott Publishing Co. Ltd. Price 6s. net.—This book is purposed for the laity rather than the medical profession, and is written in a way to be understood of all. It consists, to use the author's words, of "empirical observations, psychological and sociological in character. Its issue presupposes, as is now the wont, that there are complex problems of sexual life needing to be fathomed, a mysteriously profound relationship between the sexes to be still further elucidated, and a constant and prejudicial reverie on procreative function to possess the minds of the rising generation. Be it said that the author, though expressing himself with frankness, has not willingly pandered to any would-be salacious palate, and although there is the usual review of prostitution and illicit intercourse in general, of the hygiene of matrimonial life and its transgression, of monogamy and polygamy, and so forth, we do not find anything which need bring a blush to the cheek of the not too young person. We would not recommend

[1] *Proc. Roy. Soc. Med.* (Sect. Dis. of Child.), 1914, vii. 186.

it, however, to any but those of mature years. We think the author's advice as to the gradual enlightenment of children in sexual matters the best that can be given under the vexed circumstances; he especially deprecates the mystification of the curious young by fables or directly false statements, or even the constant shelving of all instruction until a full revelation be forced at puberty. It will be seen, nevertheless, in his very impartial treatment of the subject, that the treatment of the child must be individual, and, far preferably, the enlightenment should be made by the parents. Dr. Michels candidly avows and justifies his approval of the reasonable limitation of families by preventive measures, and pleads that means should be devised to render these less offensive to delicate susceptibilities and more certain in achieving their object. His suggestions to married women as to methods for preserving conjugal fidelity are naive and no doubt well based: we will not quote them here. It cannot be said that there is anything very novel in this work—the whole subject has been discussed at all times and in all places almost *ad nauseam;* but there is doubtless a considerable section of the lay public who are interested in these matters, and who have escaped the mass of often offensive sex literature launched on the medical reviewer. To these, provided they do not seek merely prurient matter, we can recommend Dr. Michel's book. It bears the stamp of honest purpose and measured expression, and is worthy of the contemporary science series which has issued it.

A Handbook for the Post-Mortem Room. By ALEXANDER G. GIBSON, D.M., F.R.C.P. Pp. viii, 140. London: Oxford Medical Publications. 1914. Price 3s. 6d. net.—This manual fulfils its purpose admirably, and contains within a brief space all the detailed instruction necessary for the *post-mortem* clerk or demonstrator. It will be found accurate in detail and very practical, and should be widely used by students and resident officers. It is perhaps too elaborate for those who only very occasionally have the opportunity of making an autopsy. The Basle nomenclature is adopted throughout.

Spectrum Analysis Applied to Biology and Medicine. By the late C. A. MACMUNN, M.A., M.D. Pp. xiv. 112. London: Longmans, Green & Co. 1914. Price 5s.—This little book is prefaced by a graceful personal tribute to the late author by Prof Gamble, who calls attention to the fact that the research was carried out when he was far removed from the facilities of a laboratory or university, and in the scanty leisure afforded by a practice and volunteer duties. The book gives an account of MacMunn's valuable observations on the spectra of the various pigments of plants and invertebrates, as well as those of more immediate medical interest.

Editorial Note.

Antityphoid Inoculations.

THE value of antityphoid inoculations has recently been the subject of public discussion and of irresponsible criticism; it is therefore desirable to review the results hitherto obtained, so as to have substantial "foundations for our belief" in the method. We are indebted to Professor Walker Hall for the following notes.

The example set by the British Army Authorities with regard to the prophylaxis of typhoid fever has been copied by a number of nations, and bids fair to prove one of the outstanding advances in modern methods of hygiene. It is possible that the evidence accumulating from the present campaign will result in our following the lead of America and Germany, and instituting compulsory inoculations for the services, etc. The following figures place the validity of the practice on a firm basis. In those instances where the numbers inoculated are available, they are placed under the percentages. Although the data are not strictly comparable, Major Greenwood, jun., of the Medical Statistical Department, states that taking them from the worst possible standpoint, they show "the ratio of cases amongst the uninoculated to be more than six times that amongst the inoculated."

	Case Incidence.		Case Mortality.	
	Inoculated.	Not Inoculated.	Inoculated.	Not Inoculated.
	per cent.	per cent.	per cent.	per cent.
United States Army, 1898	—	—	—	8.5 / 1,729
" " " 1911	—	—	0.001 / 12,801	—
French Army—				
Before Inoculation	—	13.82	—	2.23
Voluntary Inoculation..	3.96	—	0.53	—
Compulsory Inoculation	0.68	—	0.11	—
German Army in Africa..	5.09	9.84	—	—
French Navy	0 / 3,107	0.8 / 67,843	—	—
British Army in India	0.98 / 4,502	2.54 / 25,851	—	—
British Army — Foreign Stations	0.53 / 10,378	3.04 / 8,936	8.9	16.9
Various Hospital and General Statistics ..	2.25	5.75	12	21

The seat of injection seems to vary with the individual, but the general consensus of opinion points to the scapular and deltoid areas as yielding the least discomfort to the patient.

The dosage also has not been uniform. For ladies and young people there are many who prefer three or four doses of 100, 250, 500 and 1,000 millions, instead of the customary two injections. After the injection it has been found necessary to diminish muscular work for twenty-four to forty-eight hours, if ill-effects are to be uniformly avoided. The local and after-effects depend to some extent upon the methods used in preparing the vaccine. The ideal vaccine is still the pursuit of many research workers.

The appearance of antibodies in response to the injections does not seem to be generally realised, and cases have occurred in which a subsequent Widal reaction has led to the diagnosis of enteric fever. In one of their experiments, Pfeiffer and Kolle found that on the eleventh day after

injection of dead typhoid bacilli the agglutinating powers of the patient's blood rose five to fifty times above that of normal blood, and the bacteriolytic power had been increased five-fold. Perhaps it may some day become necessary to determine the titre of the blood as a test of immunity. During an attack of typhoid fever the agglutinating value of the blood is inconstant and tends to fall; after preventive inoculations it rises and remains steady. Hence a number of determinations of the agglutination titre may yield useful information in doubtful cases. If the patient has been inoculated against enteric fever the agglutination tests should include other organisms than the B. typhosus, and blood cultures should be made as a routine procedure.

Much has been written as to the period of the resistance obtained. Many place it as long as two years. Others say six months. In the present state of knowledge, it appears that the patients should be inoculated whenever they return to England.

There are still those who lend their influence to dissuade the soldier or civilian from safeguarding himself by prophylactic injections. It must be difficult for those who are in the midst of this kind of work to appreciate fully the attitude of such dissentients. The laboratory worker is accustomed to test his opinions and findings by personal experiments, and to record actual results. If those who oppose this form of inoculation would personally put their tenets to the test by exposing themselves to contagion in trench, field or hospital, no one more than the scientist would be ready to accord credit for their work, and to consider their figures without prejudice. Such a course might lead to an advance in knowledge. The mere crying out on placards and pamphlets leads nowhere.

Owing to the possibility of paratyphoid infections, either as single infections or as an addition to that of the typhoid

bacillus, it has been suggested that mixed prophylactic vaccines should be used. This proposal merits serious attention, especially as a paratyphoid attack may be ascribed to a mild form of typhoid, unless the agglutination tests are applied more fully than is now customary.

Therapeutic Notes.

Camphor is a drug concerning which there is considerable difference of opinion among clinicians, while experimental pharmacologists also seem uncertain as to the actions which may properly be ascribed to it. In ordinary medicine it is of course largely employed, but so artfully has the official poly-pharmacist combined it, that it is impossible to say to what extent its presence in Tinctura Camphoræ Co. is responsible for the popularity of that time-honoured ingredient in cough mixtures. Externally we are on safer ground, and the irritant and rubefacient action on the skin no doubt contributes to the effect of the compound liniment.

As regards the pharmacology of camphor, some would compare its action to that of picrotoxin, which produces convulsions by stimulating the medulla, while others consider that it resembles cocaine, which in mammals stimulates the cerebral cortex and causes epileptiform fits.

In any case, it appears clear that large doses in mammals ultimately depress the cerebral and medullary centres, causing loss of consciousness and failure of the respiratory centre. Moderately large doses have an action on the heart and respiration, the constancy of which, however, seems doubtful. Camphor is excreted as an inert body combined with glycuronic acid, and it is possible that this combination in some individuals or in certain circumstances may take place so rapidly that the characteristic action of the drug has no time to manifest itself. At any rate, it seems clear that all who profess to get appreciable

results in cardiac or respiratory failure from the administration of camphor are unanimous in prescribing large doses.

The British Pharmacopœial dose of camphor is 2 to 5 grains, but it seems clear that larger doses must often be given if any marked action on the central nervous system is to be obtained. The favourite continental method of administration is by means of hypodermic injections of the oil, which is a 20 per cent. solution exactly corresponding to the B. P. liniment. Others prefer a 10 per cent. solution, whilst Viron of the Salpêtrière recommends that 10 per cent. of pure ether should be combined with the same strength of camphor in sterile olive oil purified according to the French codex. Watery 1 per cent. solutions have also been used, but even intravenously they appear to have but little effect. Probably for long-continued administration at least 7 to 10 grains must be given hypodermically in twenty-four hours; good results have been claimed in chronic phthisis by these means. In pneumonia larger doses still have been given—35 grains every twelve hours by some, and 3 grains every three hours by others. One gram to 10 kilograms of body weight, or 150 grains per diem to a man of eleven stone, is recommended by one recent writer.

Apropos of these heroic doses, it may not be out of place to remark that the toxic effects of camphor are mental excitement, headache, incoördination, tinnitus, sweating, and occasionally convulsions. Death occurs from respiratory failure.

A single dose of 20-30 grains would probably be followed by toxic symptoms in most adults, and if a series of injections are to be given the effect of any dose above 10 grains should be carefully watched. As it is usually excreted quickly, there would be little danger in repeating a dose found to be innocuous in three or four hours.

Camphor injections have been used to stimulate the heart in poisoning by chloral hydrate and other narcotic drugs; it is stated by some authorities to have a direct action on the cardiac muscle, while Boehm thinks that experimentally the action of camphor is more marked on a heart poisoned by chloral than on a normal organ. Recent experiments have not

extended this result to other morbid conditions of the cardiac muscle.

No doubt owing to the doubtful effects of the drug, advocates of its use in pneumonia have suggested that its action may not merely be that of a cardiac or respiratory stimulant, but that it may in some way oppose the pneumococcus or other organism causing the disease. Recent experiments on animals do not appear to give much support to this view. Camphor is of course an antiseptic, and has a general inhibitory action on protoplasm, but this is too weak to have an appreciable effect on a septicæmia in medicinal doses.

Menthol is a substance which from the pharmacological point of view is somewhat similar to camphor, though chemically it is not nearly related. Enormous quantities of menthol are prescribed annually in the form of Aqua Menthæ Piperitæ, and externally the drug is not uncommonly used for its local anæsthetic action. But possibly it might with advantage be more frequently prescribed as a serious remedy. Its main uses are as a local anæsthetic and antiseptic, and a vasodilator in diseased conditions of the mucous membranes of the nose and upper respiratory passages and of the stomach and intestines. For coryza it may be employed either as an ointment or dissolved in liquid paraffin (25 per cent.), of which ten drops may be instilled into the nose with a pipette. Olive oil (but not almond oil) is also a suitable vehicle. A teaspoonful of a 5 per cent. alcoholic solution may be used in a steam inhaler, or a similar solution double strength be inhaled from a handkerchief once or twice a day.

For the troublesome headaches which may accompany coryza the following snuff has been recommended :—

Menthol, 1 part.
Boric Acid, 2 parts.
Powdered Orris Root, 4 parts.
Milk Sugar, 4 parts.

In young children and infants severe reflex spasm of the glottis has sometimes been observed when menthol is applied

to the nasal mucous membrane, and in adults it has sometimes too irritant an action, causing conjunctivitis, eczema or urticaria.

In the gastro-intestinal tract menthol has been credited with considerable success as a pain-killer. Obviously it will act best where a carminative is required, but its local anæsthetic and antiseptic action may also be valuable. In dyspepsia 2 or 3 grains may be given in a cachet with milk sugar; it is useful in allaying vomiting, provided that no organic lesion such as an ulcer is present in the stomach. It has also been recommended in the vomiting of cholera and dysentery.

As a skin application menthol is mainly used to allay itching, either as an ointment or a spray. For the former it may be combined with equal parts of camphor and chloral-hydrate, and 30 per cent. of the mixture made up with vaseline. As a spray 10 per cent. menthol may be added to equal parts of spirits of camphor, chloroform, and ether.

J. M. FORTESCUE-BRICKDALE.

MEETINGS OF SOCIETIES.

Bristol Medico-Chirurgical Society.

January 13th, 1915.

Dr. W. H. C. NEWNHAM, President, in the Chair.

Dr. D. ALEXANDER read a paper on **Epilepsy in Later Life.**

Abstract.—Late onset is comparatively rare in true epilepsy, seizures of this character in the seventh decade being usually attributable to structural lesions of senescence and decay. Three cases are cited which are not to be accounted for by these antecedents. In one case there are petechiæ on the face and neck which suggest concomitant hemorrhages in the cortex.

Dr. J. MICHELL CLARKE read a paper on **The Uses of Bleeding.**

Abstract.—Chief uses of bleeding are: (1) to relieve an over-distended right heart; (2) to produce a local effect on some organ; (3) to act by the direct removal of a certain quantity of blood. (1) Mechanism of relief of right heart by venesection.

Importance of venous inflow into auricles for maintenance of systolic output of ventricles. Value of and indications for bleeding in mitral stenosis, in diseases of the lungs, in passive congestion of the liver, in apoplexy. (2) The use of bleeding in pericarditis, pleurisy, anuria of acute kidney diseases. (3) Venesection in uræmia, in chronically enlarged and failing hearts.

Mr. HEY GROVES gave **An Account of some Surgical Experiences at the Base Hospitals in France,** illustrated by the epidiascope. *Abstract.*—Some of the voluntary hospitals in Paris. A day's work at a field hospital. Bringing the wounded into Paris after the battle of the Marne. The French military hospital at Val-de-Grace. Comments on certain groups of cases: head, spinal, chest, abdomen, bones and joints. Some of the Boulogne base hospitals. Problems of transport. Sepsis. Secondary hemorrhage. Gas gangrene.

J. LACY FIRTH,
J. M. FORTESCUE-BRICKDALE,
Acting Hon. Sec.

Local Medical Notes.

University of Bristol.—Professor A. F. Stanley Kent, Professor of Physiology, has been awarded the Honorary Degree of D.Sc. by the University of Oxford.

EXAMINATION RESULTS.

Students of the University have recently passed the undermentioned examinations: —

UNIVERSITY OF BRISTOL.—*M.B., Ch.B., Intermediate Examination:* Evelyn B. Salter, J. D'A. Champneys. *D.P.H. Examination:* W. A. Reynolds.

CONJOINT EXAMINING BOARD OF ENGLAND.—*Medicine:* W. K. Richards, C. N. Vaisey.* *Surgery:* W. K. Richards.* *Midwifery:* J. W. Gilbert,* G. S. Terry.*

L.D.S., R.C.S. ENG.—*Final Examination:* W. A. Culverwell,* W. J. Milton,* Marjorie J. White.*

APPOINTMENT.

A. G. T. Fisher, M.R.C.S., L.R.C.P., has been appointed Senior Resident Officer at the Bristol General Hospital.

* Qualified.